

CHOICE

NEW WAVE IN THE WASH

Lifting the lid on the latest detergents

**PLANS FOR
SAVING MONEY**
Pitfalls to watch for

**BEAUTY AND
THE BEASTS**
Avoiding cosmetics
tested on animals

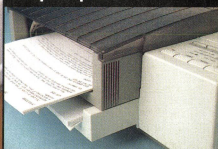
Multi-disc CD players



Video recorders



Computer printers



CHOICE

The magazine of the Australian Consumers' Association ACN 000 281 925

Council Member of the International Organization of Consumers' Unions
CHOICE is a registered trademark of the Australian Consumers' Association

Registered Office: 57 Carrington Road, Marrickville NSW 2204 Telephone: (02) 558 0099

Subscription enquiries: (02) 558 8088 Fax: (02) 558 9341

PUBLICATIONS

Managing Editor: Catherine Gray Deputy Manager: Jane Mackenzie

CHOICE: Jane Mackenzie (Editor) Consuming Interest: Alison Kahler (Editorial co-ordinator)
Books: Keren Lavelle (Commissioning Editor) Journalists: Peter Cerech, Christopher Connolly,
Tom Crawley, Colleen Ford, Alison Haynes, Natalie Hoy, Jackie Lacey

Production: Louise Williams (Manager), Chris Roberts (Designer), Joe Sydney

Verification: Elizabeth Montague (Manager), Ron Birmead, Pam Gardiner, Ruth MacKay
Marketing: Bob Asser

FINANCE & ADMINISTRATION

Manager: Alan Johnston

Accounts: Jeanette Dwyer, Wolf Sommer, Scott Carruthers

Administration: Robyn Miller (Co-ordinator), Peter Griffin, Joanne Kladis, Christine Shaday,
Joyce Slattery, Roslyn Sydney Reception: Sandra James

Subscriptions: Thelma Bracken (Senior Supervisor), Jean Gordon, Simone Hamilton, Rosemary Martin,
Jeanette Porter, Kerry Preston, Chantal Pucella

Data Processing: Tim Fleming (Manager), Tony Harrison, Kathy Theochari

POLICY & PUBLIC AFFAIRS

Manager: Louise Sylvan Deputy Manager: Phil Marchionni

Executive Assistant: Maryann Scott Media Liaison: Geoff Simai, Fiona Wylie

Information: Jenni Noble (Co-ordinator), Jacqueline Isles, Sandra Leach, Chris Ruggles

Project Officers: Robert Drake, Lioba Rist

Resource Centre: Hazel Bowley (Manager), Maria Athanasatos, Ken Lovett, Christine Power

TESTS & RESEARCH

Manager: Norm Crothers Deputy Manager: Neill Patterson

Administration & Marketing Co-ordinator: Lisa Walton

Tests & Technical Research: Neill Patterson, Des Shales, Bernadette Walsh (Project Managers),

Jane Bowden, Brian Champion, Annette Coburn, Stephen Fisher, David Hilliger, Rob Irwin,

Marissa Newich, Louise Newey, Raja Rajagopal, Beverly Reichman, Helen Ross,

Max Wijasuriya, Clive Holmes (Program Manager)

Survey Research: Christine Franks (Manager), Theresa Thomas (Senior Researcher),

Kate Murdoch, Mary Heffernan, Laraine Hall, Russ Hausfeld and Peg Hayman (Consultants),

Elizabeth Craig, Michelle Sprod, Chris Ho, Dorothy Kneale, Jan Rigby

Market statistics provided by GFK Marketing Services Pty Ltd.

CHOICE is published by the Australian Consumers' Association (ACA), an independent, non-profit, non-party-political organisation. The Consumers' Association is funded primarily through subscriptions to its magazines and also from some fee-for-service testing. We aim to provide consumers with information and guidance about goods and services. In addition we seek to represent and lobby on behalf of consumers to balance the influence of manufacturers and service providers.

All products tested for CHOICE are bought randomly in the marketplace and no samples are accepted. Evaluations are based on tests, trials and expert judgments as appropriate. These findings should not be applied to models other than those nominated in CHOICE. We do not necessarily evaluate every available product or service in a particular class. We check the results of our tests just before publication with manufacturers, but specifications and quality may vary. If this issue is no longer current check with us or the manufacturer to determine if important changes have taken place before you buy. If, despite our extensive checking, a mistake slips through we will publish a correction as soon as possible.

No information in CHOICE may be used in advertising or for any promotional purposes and the Consumers' Association will take all possible steps to prevent such use of its material, its name or the name CHOICE.

The ACA is governed by an honorary council elected by the voting members. (For information about voting membership please contact our Information Service on (02) 558 0099.) Members of ACA's Council give their time without reimbursement. They are not engaged as principals in industry, advertising or sales.

COUNCIL

Chair: Wayne Haylen, B.A., LL.B., Q.C. Deputy Chair: Ian Lowe, B.Sc., D.Phil.

Members: Allan Barton, Ph.D.; Professor G. Bennett, B.A., Ph.D., A.S.T.C.; Paul Bingham, B.A.(Hons), LL.M.;

John Braithwaite; Simon Chapman, Ph.D.; Graham de Vahl Davis, A.M., B.E., Ph.D.; Richard Gartrell;

John Hirstman, M.B.B.S. (Hons), D.P.H., D.T.M.H.; F.R.A.C.M.A., Bruce Kercher, B.A., LL.M.;

David Marcus, B.A.(Hons); Lisa Mather, LL.B., Steven Pyatt, M.Sc., C.Text.A.T.I., Grad.Cert.Ed., Adv.Desp.Ed.;

Itzhak Rez, LL.B., M.B.A.; Suzanne Russell, M.B.A., B.Ed. (Home Economics); Liesel Scholten, B.A.(Hons);

Dip.Ed., M.A.Ps.S.; Associate Professor E.L. Wheelwright, D.F.C., M.A.; Graeme Wiffen, B.A., LL.M.

GENERAL MANAGEMENT

The Association is managed on a day-to-day basis by a committee comprising the four department managers and a staff-elected representative.

Editorial

AT CHOICE we keep up with product developments all the time, modifying our test methods to take new features and products into account. So we were interested late last year to find a minor revolution going on among laundry detergents — most of them were to be reformulated in the next 18 months or so. The reason? The reintroduction to Australia of products containing enzymes, and the use of zeolites to replace environmentally suspect phosphates.

We decided to do a quick test on the new detergents you'll be finding in the shops already, to see if the new ingredients make a difference. You might not even realise some of the detergents are new — the names are still the same — but some of these new or reformulated products turned in a really good performance. You can see the results starting on page 9.

Detergents are an example of CHOICE in its role of sorting out the good products from the mediocre. *Beauty and the beasts* on page 14 highlights another role — that of providing information to consumers to help you make buying decisions that are less clear-cut.

"Not tested on animals" has become quite a marketing cry for cosmetics companies, and it's an attractive buying criterion. In reality it means a host of different things ranging from the idealistic to the downright pragmatic. Questions to ask include: What wasn't tested — the cosmetic? the ingredients? How long ago? Maybe not for *this* cosmetic, but for another — and so on.

All we can do is provide you with the information to ask intelligent questions of the companies concerned, so you can decide on your own 'policy' and your own way of exercising your purchasing power — perhaps by choosing the products of a company that is genuinely trying to move away from animal testing, and boycotting those of a company that doesn't seem interested in the issue.

Knowledge makes you a powerful consumer!

Jane Mackenzie
Editor



Features

6 A guide to regular saving

If you're saving for anything from a deposit on a house to a holiday, you should be investing your money. Our article discusses various types of savings accounts and plans, and tells you what to look out for so you don't lose money.

14 Beauty and the beasts

"Not tested on animals" — behind this apparently simple phrase lies a world of different interpretations. We tell you the state of play with testing cosmetics on animals, and what to ask to find out if a company is at least heading in the right direction.



Cover photo: Kent Mears

Tests

9 Laundry detergents

There's something of a revolution going on in the detergent aisles of the supermarket — new products containing enzymes and zeolites, and new brands. What's the point of the new ingredients, and how do they perform in the tub?

21 Kids' fruit snacks: something to chew over

A chewy fruit strip may be considered cool in your child's lunchbox, but does it offer the same food value as an apple or a pear? We looked at what's in some of the fruit substitutes appearing on the market.

29 Computer printers

We tested 18 printers under \$750, with technologies ranging from dot matrix through inkjet to thermal fusion, and from portable to full-scale desktop. There's something for everyone in this bunch.

36 Video recorders

The cheap end of the video market offers all the quality and features most people want these days. We tested 11 models under \$500, and paid particular attention to how easy they are to program to record.

42 Multi-disc CD players

They seem good value for money and on the whole easy to use — we checked out 11 at the budget end of the market.



Departments

4 Choice Cuts

Phone charges; safer baby capsules; CHOICE on tape; class action over heart valve settled; Australians still concerned about the environment.

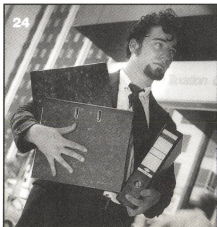
18 Consumer Bookshelf

24 Consumer-in-law

The taxman and you — your rights and responsibilities as a taxpayer.

47 What do you know?

Test yourself with our regular consumer quiz.



21



Next issue

Televisions, flued gas heaters, shampoo vacuum cleaners, sewing machines, recycling review, child car seats, insulation.

May, June, July

Tests: Fridges, low-alcohol beer, perfume, long-life light bulbs, exterior paint, electric wall ovens, car batteries, water heaters, vacuum cleaners, supermarket survey, are low-tar cigarettes really low-tar?

Features: How different heating types compare, asthma management, cereals and grains, what do you know about being a 'green' consumer?, slimming products, glues, hiring tradespeople, what it costs to get a product into a supermarket, investing in property, mattresses, the insurance dispute review scheme — is it working?



CHOICE CUTS

Farsighted

AUDIO CHOICE

If impaired eyesight makes it hard to read CHOICE, here's something you should know about.

Each month CHOICE is put onto audio cassette tape by the Royal Blind Society of NSW. If you live in NSW and subscribe to the service you can get hold of the tapes and listen to CHOICE. The annual subscription fee charged by the Society is \$16, with an additional charge of \$1 for each tape retained.

A copy of CHOICE fits onto a single cassette tape and runs for around three-and-a-half hours. This requires a special tape format

for which you'll need a talking book machine, available free of charge to people in NSW with print disabilities.

CHOICE is narrated by two people, Marion Cumming and Nicholas Opolski, who read alternate paragraphs and headings to make the articles more 'listenable'. Between each article there's a short section of music. Obviously there are problems when it comes to the tables, graphs and diagrams, but subscribers can call the Society's library for further information.

Audio CHOICE is sent to the Royal Victorian Institute for the



Audio CHOICE makes for informed listening.

Blind and to the Braille and Talking Book Library in Victoria. For information on Audio CHOICE in other states please contact the Royal Blind Society's library on (02) 334 3333.

Phone costs

FAIL FEE FOR FAX AND PHONE

WE are hearing more about charges for what appear to be unsuccessful phone calls or faxes. The advent of the itemised account is one reason for this — elapsed time for time-charged calls or faxes is shown on the bill. Can you be charged when the line is engaged or keeps ringing?

Bill list phone or fax calls lasting only seconds. They only cost you a few cents each time, but you wonder if you actually made the call or if it's a mistake. Perhaps you're inclined to write them off. But the cents add up when there are millions of accounts. What's going on?

Telecom and Optus start charging from the time the call or fax is answered. But the answer may be

nothing more than the phone or fax at the receiving end sending a signal to say it has accepted the call.

Some PABX switchboards will accept the call and connect you through to the correct extension. If no-one picks it up the caller will hear a ringing or engaged tone and believe there's been no connection. But the caller will be charged for this. A similar situation can exist with a call to a combined fax/phone where the machine automatically answers the call and passes it from the fax to the phone part.

If the line has a non-Telecom diverter to pass all calls to a second service you can be charged even though the call appeared to be unsuccessful. Other problem areas

include some calls to a modem, to an answering machine which has run out of tape or to a line with a private (non-Telecom) recorded voice announcement where the caller might assume mistakenly it's been a free call.

A number of events can stop successful transmission of a fax, including when it's run out of paper, when there's a document jam, when there's no power to the receiving machine, or when there are incompatibilities in signal strength between the sending and receiving machines.

In all these cases the caller might hear nothing more than the common ringing or engaged tones, or maybe just silence, and think there has been no charge. Look at your next account carefully.

Telecom admits it is sometimes in the wrong, but with deregulation it says its responsibility ends "at the plug in the wall". People are putting all sorts of equipment on their ends of the line, including machines which make the connection even though you don't make a successful call.

If you feel you've been over-charged or charged unfairly get in touch with Telecom — or Optus if it's the provider — and ask for an explanation.

CORRECTION

WASHING MACHINES

(CHOICE, January 1992)

THE AEG Oko Lavamat Sentsortronic 645 was tested at the wrong spin speed. Tested at the right speed it scored 75% for spin efficiency, giving it an overall score of 82% and making it the equal best performer in the test. The list of Best Buys on page 41 does not change, but the AEG moves to equal top position in the table on page 43.

We stated on page 40 that a 7 kg wash load was an over-ambitious claim for the KLEENMAID KAW651. Although the compliance plate on the rear states 7.5 kg, this is apparently based on the US Standard — the load capacity on the Australian energy label is in fact 5.5 kg. The performance results in the tables on pages 44/45 are not affected. The warranty is also different from that given — it should read: "Three years full parts and labour, plus extended parts-only warranties of two years on the gearbox and 17 years on the stainless steel bowl." Installation is included in the purchase price.

UPDATE

HOME SICK

(CHOICE, January 1993)

The Allergies and Intolerant Reactions Association listed on page 35 should now be contacted through:

PO Box 717
Mawson ACT 2607.



NEW BABY CAPSULES

MANUFACTURERS of baby capsules are on notice that eventually all baby capsules must comply with the new Australian Standard AS1754-1991. This Standard requires the baby capsule to give the infant occupant greater protection in the event of a rollover crash than the current Standard.

While it's normal practice for the government to give manufacturers around two years in which to sell old stock before a new Standard becomes compulsory, manufacturers whose product carries the StandardsMark have already adopted the new Standard before the end of this month.

This doesn't necessarily mean you won't be able to buy or hire an older-style capsule — you may be faced with a choice of products as retailers sell old stock.

Additionally, the new Standard will not apply to baby capsules sold secondhand, or, in some situations, those used for hire. This means having to decide between two levels of safety.

It all comes down to risk assessment. The generally accepted opinion is that rollover crashes occur in around 5% of all accidents — and that most of these happen on country roads.

We also know that a van or 'people-mover' is more likely to

roll than a sedan, simply because its centre of gravity is higher than that of an ordinary car.

Anyone involved in a rollover is in a very dangerous situation. No two crashes are alike, but the chances of getting hurt are extremely high. The Australian Standard's test attempts to simulate an 'average' rollover by tipping the capsule upside down and running it at speed along a crash sled. The forces created are quite severe, and yet it is only a simulation.

If you really want to increase your level of safety and that of your children, *don't drive too fast and drive appropriately*. Generally speaking, rollovers happen as a result of speed (that's why they rarely

happen in the city), and deviant behaviour on the part of the driver. That is, the driver made a mistake, allowed him/herself to become distracted, or allowed his or her judgment to be affected by alcohol, drugs or drowsiness/fatigue.

Both types of capsule will protect your child much of the time — but in a rollover accident, one will offer more protection than the other.

Make sure any capsule is anchored properly by the tether strap, and if you're not sure how to fit it properly, your local traffic authority can fit it for you for around \$10 to \$20, or refer you to a fitting station.

Regardless of the type of baby capsule you buy or hire, the message is — slow down.



Eventually it will be illegal for retailers to sell this type of baby capsule — the body band does not seem sufficiently capable of restraining a baby in the event of a rollover crash.



The new-model Safe-n-Sound baby capsule complies with the new stricter 1991 Australian Standard, and has a full body harness, all of which is designed to give a baby a better chance of survival in a rollover crash.

Environment

GREEN CONCERN STILL STRONG

WITH the economy and unemployment to worry about, are Australians still concerned about environmental issues? Yes — according to the findings of marketing and social research company Frank Small & Associates.

The company has conducted national surveys using face-to-face interviews around the country since 1989. The latest survey was done last year and found air, water and beach pollution were still the major areas of environmental concern. Around half those interviewed claimed to be 'extremely concerned' about these problems.

Air pollution is now the issue of concern to the highest number of people, having overtaken water and beach pollution (ranked first in 1989, 1990 and 1991). The ozone layer is in third place, followed by chemical residues in water and soil, the greenhouse ef-

fect, non-recyclable plastics and development in wetlands and rainforests. Lower down the list of concerns is soil degradation — arguably Australia's most pressing environmental problem.

Although the surveys found a downward trend in the level of 'extreme concern' within the community, it is still high: one in three Australians has major concerns about environmental problems. The surveys also found more than one in four shoppers would still 'agree strongly' that they would be prepared to pay around 5% to 10% more for products marked environmentally safe. This view has changed little since 1989.

Willingness to recycle has become stronger. A third of householders in 1992 said they would 'strongly agree' to keep cans, paper and plastic bottles in special bins for recycling, compared to a fifth in 1989.

Legal action

HEART VALVE CLASS ACTION SETTLED IN U.S.

IN the early 1980s there was a scare over the safety of an innovative replacement mechanical heart valve manufactured by Shiley Inc of California. Numbers of the BJORK-SHILEY CONVE-XO-CONCAVE HEART VALVE (C-C VALVE) had fractured inside the recipient's body, leading to death in many (though not all) cases. C-C VALVES were recalled in Australia during 1982 and 1983, but as many as 100 Australians may have been fitted with this product.

Litigation followed. News has come that the US District Court in Cincinnati, Ohio, has approved terms of settlement of the class action over the C-C VALVE. The settlement provides compensation for medical and/or psychological counselling, valve replacement surgery and for death or perma-

nent disability due to valve fracture or valve replacement surgery.

There are many Australian patients who received the valves which are the subject of the class action and their legal rights may be affected.

According to Sydney solicitor Dr Peter Cashman this settlement "includes only recipients of the C-C VALVE living at the time the class action was tentatively approved (January 1992) and their current spouses. The settlement does not affect the rights of persons who experienced valve fractures, died and/or had their C-C VALVE(s) removed prior to that time (or their survivors). Nor does it concern artificial heart valves other than the C-C VALVE." Those not covered by this settlement should consider getting legal advice about their own situations.

A GUIDE TO REGULAR SAVINGS

**Safer
than under the
mattress?**

If you're saving for your child's education, the deposit on a home, a holiday, a new car or just for a rainy day, you should be investing your money.

An ideal savings scheme should:

- ✓ ***Make saving easy and encourage commitment to saving by, for example, taking money automatically from your bank account or pay.***
- ✓ ***Keep your capital safe.***
- ✓ ***Allow you to get your money back if you need it.***
- ✓ ***Offer you a good investment return.***

WITH SO MANY different options available for regular saving, it's impossible to pick the one that will do best in the future — because nobody can be sure how investments will perform. However, it is possible to give advice about the types of investment suitable for regular savings, and about what to look for. It's this that we've concentrated on doing in this article. In particular we look at the different sorts of savings accounts and at the savings plans offered by life insurance companies.

Your first move should be to read *Your basic financial requirements*, below, where we set out four important factors which shouldn't be overlooked when planning your financial future. Then use this report to help you decide what types of savings option would be suitable for you.

You're likely to find you need further advice. This is available from financial advisers and planners, accountants and solicitors, and from insurance brokers. The CHOICE report *Sold!* in February 1992 will help you get to grips with the service offered by insurance agents and brokers. *(Invested interests* in March 1990 gives advice on how to find an independent financial adviser.

YOUR BASIC FINANCIAL REQUIREMENTS

BEFORE WORRYING about where to put your savings you should take a look at your financial situation and consider your own personal needs. The following are the basics to consider:

■ **Buying a home** not only gives you somewhere to live, but in the past — though not necessarily in the recent past — has been a good investment, too.

■ **An 'emergency fund'.** You should have money somewhere you can get at quickly if necessary. How much you should have in your emergency fund will depend on your personal circumstances — think about your likely crisis expenses.

■ **Insurance.** If there's anyone who depends on you financially, make sure you've got sufficient life insurance cover. When finding out about insurance concentrate on 'term' insurance, which is the cheapest sort of cover for providing benefits when

you die. (We'll be publishing an article on life insurance later this year.) Also check out what's available through your employer, or bundled with your existing super scheme. You might also want to look at income protection or disability insurance, and maybe at joining a health fund.

■ **Superannuation.** A scheme to provide income when you retire is an important part of financial planning. It can be difficult to start putting money away for your retirement in 30 years, say — after all, retirement seems so far away — but it can be tax-effective, particularly if you're self-employed. The downside is that, once in a super scheme, your money is pretty well tied up, and the charges and fees for schemes can be high — in particular for those run by life insurance companies. If you want to make additional super contributions and you're employed, check to see if you can make them through your employer. For more advice see CHOICE, June 1990.



Savings accounts

Good for: Flexibility and access; low or no charges; low investment risk.

Bad for: Poor potential for high investment return.

Perhaps the most familiar place for keeping money you don't need to use at the moment is a savings account with a bank, building society or credit union. These institutions offer a range of different accounts to suit different needs. Generally the more savings you build up and the longer you're prepared to invest them for, the higher the interest rate paid. See Figure 1 for examples of what's on offer.

If you have trouble saving and need to make a commitment, most financial institutions will transfer money from one account to another automatically each month; check whether there is a charge for doing this.

Figure 1:
Typical savings account interest rates.

Most institutions have a range of different accounts offering different interest rates (we give typical ranges for investments up to \$5000). Rates are those current in December 1992, and are shown before deduction of any income tax that's due.

Cheque account	2.5% to 4%
Passbook account	2.25% to 4.5%
Regular savings account	4% to 5%
Christmas club	4% to 5%
Mortgage offset account	4% to 5%
Other investment accounts	3% to 4% (more on higher balances)

■ Cheque/savings accounts

The easiest place to save is to let money accumulate in your everyday account. However, even if you've got an account which pays a comparatively good rate of interest you're probably only getting around 3% before tax, and other types of account should offer you a better deal. See CHOICE, September 1992, for our latest report on these accounts.

■ Accounts for regular savers

There are accounts, for example from Advance and Westpac, which are designed specially for regular savers. They pay extra interest if, for example, there is one deposit in a month and no withdrawals. There are also accounts designed with next Christmas in mind — often they will pay a higher rate of interest if you leave the money there till the beginning of December, say, and maintain a specified minimum balance.

■ Mortgage offset accounts

If you've got a mortgage with an institution which offers one of these accounts you can put money in it and have the notional interest paid towards your mortgage repayments. For example, the State Bank of NSW's All-in-one account pays 5.5% interest on savings over \$1000, and this can be paid towards your mortgage. The advantage of doing this is that there's no income tax to pay on the 'interest'. If you have a mortgage this is probably your best option for regular saving, as you're effectively increasing your mortgage repayments as well as losing none of your savings in tax.

■ Investment accounts

Most of these aren't specially designed for regular saving, and although they pay higher interest, many require fairly high opening balances (often \$1000 or \$2000). One way of overcoming this is to start saving in an ordinary account and then, when you reach the minimum balance for a higher-paying account, switch to that. You might then continue saving this way, regularly moving lump sums of, say, \$500 or \$1000 from one account to the other.



Other savings options

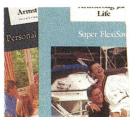
Savings accounts and savings plans (described overleaf) don't necessarily offer the best avenues for you to make the most of extra cash. Here we list some of the other options you could consider:

■ Increase your mortgage repayments

One of the best 'investments' you can make is to pay off your mortgage more quickly. Every extra dollar you pay off is a dollar you don't pay interest on. And even if you need the money later you may be able to borrow it back — check with your lender.

■ Unit trusts

Like savings plans these allow you a share of a 'portfolio' of investments. On the plus side, they aren't tied to a minimum 10-year term, but against that they don't confer the benefit of tax advantages for higher-rate taxpayers. They can offer more flexibility — though because of the nature of the underlying investments it's still often necessary to take a long-term investment view or be prepared to take a loss when it comes to cashing in. Some unit trust managers are able to take regular savings, with a minimum of \$100, say, each month.



Good for: Potential gains (if the plan managers guess right); people who pay high tax rates (as long as you can commit the money for a long period — usually 10 years).

Bad for: People on low incomes; flexibility and access; charges; can have high investment risk (depending on the underlying investments).

Savings plans are generally sold by life insurance companies, though they usually offer little more in the way of life insurance than paying out the investment if the policyholder dies during the term of the plan. Because of the special tax rules for life insurance, these plans are designed to run for a minimum of 10 years. Your premiums go to buy 'units' in one or more investment funds. These units give you a share of a portfolio of investments which may include, for example, cash on deposit, government bonds, property, and Australian and foreign shares. Such savings plans can therefore offer a range of risks — from those with a fund specialising in high-risk investments to ones suitable for the ultra-cautious which do little more than keep the money on deposit.

The tax rules for life insurance mean that if you keep the plan going for 10 years the return from the plan is 'tax-free' in your hands. This is because the life insurance company has been paying 39% tax on the unit's investment returns. If you cash in earlier you can set off the tax you'll then have to pay against your tax bill — so if you pay a lower rate of tax than 39% (as around four in five people do) you may be due a rebate.

CHOICE advice: Before you start a life insurance savings plan you should be confident it suits your needs. You should be a higher-rate taxpayer and expect to stay that way, and you should be investing money you're sure you can leave in the plan for the full 10 years (or sometimes even longer). The penalties for early termination can

be very high — you're unlikely even to get back what you put in if you cash in within the first five years — see Figure 2.

Warning: watch out for charges

Fees can be considerable — those given as examples below are on the high side but are by no means atypical.

■ Fixed charges

Policy fee: for example, \$3 per month.

■ Ongoing charges

Management fees: 1% of the total value of your investment, charged each year. Some plans have 'foundation units' which have much higher fees — so, for example, your first two years' investment might buy units with a 7% annual charge.

■ Other charges

Switching fees: You may be able to switch your units from those specialising in one sort of underlying investment to another. There's likely to be a charge for this.

Taking a closer look at some savings plans like this can reveal that less of your money is working for you than you might think. This is because some have these high charges — which reduce the amount of money that's invested on your behalf.

Nobody can guarantee how risky investments (like shares) will perform, but you can guarantee that, given the same growth, a plan with high fees will do worse than one with lower charges.

Check for high fees — both in the early months and later from each of your monthly contributions; and for high management charges — usually a percentage of the current value of your investment. You'll also need to look at the charges that will be levied if you want to stop contributing.

See Figure 2 for a comparison of investment returns from savings plans with low, average and high fees, and from a bank account.

Try to be clear about all the charges before you sign up for a savings plan. However, if after signing you find the charges are high, you can take advantage of the cooling-off period (often 14 days) to cancel at no cost. □

Figure 2: Returns compared

This table shows how different charge levels for savings plans affect the final return. The returns from savings plans are after tax (assumed personal rate 38% — 39% is the company rate). For periods less than 10 years the return would be slightly higher if your personal tax rate is lower than this, while there'd be extra tax to pay if you have a higher tax rate. The figures for savings plans are based on a 1991 survey by Rice Kachor Research and reflect the predicted performance for investment in savings plans with different life insurance companies.

To simplify the sums, figures have been worked out for a yearly investment of \$1250 (approximately \$25 per week), with the amount invested increasing by 6% per year, and a pre-tax return on fund investments of 8%. The figures for bank return are worked out for an account returning 5% before tax (with an assumed personal income tax rate of 38%).

	Years invested				
	1	2	3	5	10
Total invested (\$) (increases by 6% pa)	1250	2575	3980	7046	16476
Return from low-fee savings plan (\$)	1185	2503	3969	7603	21509
Return from average-fee savings plan (\$)	352	1440	2906	6324	19368
Return from high-fee savings plan (\$)	0	289	1694	5042	16605
Return from bank account paying 5% interest (\$)	1289	2695	4226	7702	19279

LAUNDRY DETERGENTS

They're wringing the changes in the laundry detergent market.

What's in it for you and the environment?

IF YOU hadn't already noticed, there's a quiet revolution going on in the laundry detergent department of your local supermarket.

■ **Enzyme-based detergents:** Enzymes are naturally occurring catalysts which speed the breakdown of large molecules such as proteins into smaller constituent parts, which are more easily washed away. In laundry detergents they fight stains — for example, protease will help remove protein stains like blood or egg.

Detergents containing enzymes are targeted to take more of the market as they become manufactured in Australia. Previously the unions were against their inclusion in detergents because of potential health risks to workers in direct contact on a long-term basis — some en-

zymes trigger allergic reactions. It's not normally a problem for consumers as they don't handle the detergents much, but you should wear gloves when using them if you have sensitive skin. A new manufacturing method called encapsulation means workers will be in less direct contact with enzymes and less likely to suffer skin irritations and respiratory passage problems. So it's not that using enzymes in detergents is new — CHOICE reported on them in 1970 — but they look likely to become more prominent.

Enzyme activity is dependent on temperature — each one has an optimum temperature. Below the optimum its efficacy will be reduced but it will still work to a degree. However, at a certain temperature above the optimum the en-

zyme will be destroyed — 'denatured' — and cannot work at all. Detergent enzymes tend to work best in warm water — 30° to 40°C — and will be destroyed in hot water. Chlorine will also inactivate enzymes, so don't use chlorine bleach at the same time.

Protease seems to be the most common enzyme used in detergents. AMWAY SA8 PLUS also contains amylase, which breaks down starch. BIO-Z lays claim to being the only detergent with cellulase — an enzyme its manufacturer, the Japanese company KAO, says acts on gel which forms inside cotton fibres.

■ **Zeolites** are being heralded as the alternative to phosphates — ingredients in detergents which can contribute to algal blooms in waterways. In Australia, most



powder laundry detergents contain phosphates, but zeolites are now appearing too. There are other alternatives, but zeolites are the forerunner.

In other words, it's time we looked at laundry detergents again — how do the new ingredients affect performance? We've tested all the detergents containing enzymes and/or zeolites we could find on the market in October last year (six brands), and compared them to three 'standard' detergents — one from each of the leading manufacturers, and all of which we've previously tested and found to perform well.

GETTING INTO COLD WATER

Washing in cold water saves energy, reducing both water heating bills and use of resources — it's better for both your bank balance (up to \$70 a year saved for daily users) and the environment.

Lifecycle analyses — that's when the total environmental impact of an item over its lifetime is analysed — have shown cold water washing to be less damaging than using warm water for the following environmental factors:

- Air pollution.
- Energy use.
- Solid waste.
- Greenhouse emissions.

In the case of solid waste and greenhouse emissions, if you use a warm water

wash you can reduce your impact on the environment by using gas water heating, say, instead of electric, but cold water is still the best option.

Each of the nine brands we tested washed several loads in warm water (40°C) and in cold (20°C) in an average top loader. As you can see from the results in the table overleaf, washing in cold water doesn't mean putting up with dirty clothes. There was less than 2% difference in soil removal between the warm and cold washing results for the top performers — the warm being marginally cleaner for all but RADIANT. Our spectrophotometer could pick the difference but your naked eye is unlikely to.

COLD POWER and DYNAMO were among the top scorers in a warm wash but slipped down to the second-ranking group in cold water. COLD POWER did not live up to its claim, "unbeatable in cold water". It was beaten by five of the detergents (and scored better in warm water than cold), although it still performed well overall.

Enzymes could be expected not to work as well in cold as warm water, but in fact detergents with enzymes did better overall, even in the cold wash. But bear in mind our 'cold' water was 20°C; some winter water temperatures could go as low as 5°C, which would almost certainly stop the enzymes in their tracks.

HOW DID THEY RATE?

■ **With or without enzymes:** Powders with enzymes on the whole worked better than ones without for both cold and warm washes. The exception was RADIANT, a standard detergent which rated as well as enzyme-based powders for both warm and cold washing.

■ **Zeolites vs phosphates:** There was no marked difference in washing performance between the two: products containing phosphates and those with zeolites both made it into the top performance group. DRIVE POWER SCOOP and BIO-Z, which contain both enzymes and zeolites, made it into the top-performing group for both cold and warm water, while DYNAMO, which also contains both, was in the top group for a warm wash. The fourth powder with zeolites, OMO MICRO, ranked in the bottom group for both temperatures; it doesn't contain enzymes.

The phosphate story is a complex one and simply substituting another substance such as zeolites may not be the answer in environmental terms (see *Phosphates — better the devil you know?* below for more discussion), but our test at least shows how zeolites fared in the tub.

■ **Cost per wash:** BIO-Z is good value at 29 cents for a wash effective in any temperature, and RADIANT is also worth

PHOSPHATES — BETTER THE DEVIL YOU KNOW?

PHOSPHORUS IS VITAL for life. It's found in virtually every living organism and is one of the primary nutrients at the base of the food chain. It's present in detergents in the form of phosphates. Problems occur in some conditions when there's too much phosphorus — too much of a good thing.

When levels are excessively high in streams or lakes and other conditions are right, algal populations get out of control, resulting in disasters like the Darling-Barwon river system's record-breaking bloom. At 1000 km long, the blue-green algal outbreak in NSW was the largest reported in the world. As well as looking unsightly, the blooms can make the water unfit for drinking, are dangerous for animals and can destroy other water life.

Algae are tiny photosynthesising micro-organisms. 'Blue-green algae' are now known to be a type of bacteria, but they photosynthesise like algae, and have kept this name. Like phosphorus, which acts as their nutrient, algae hold a crucial place in the food chain. Waterways which support life — plants, fish and other creatures — are

rich in nutrients and have a cloudy appearance because of their algal population.

Blue-green algal growth is triggered when a number of factors coincide, including:

- High nutrient levels, particularly phosphorus.
- Water temperature above 20°C.
- High alkalinity and low CO₂ levels.
- Calm water.
- Increased light penetration.

WHERE DETERGENT COMES IN

Many laundry detergents contain phosphates to increase their cleaning efficiency. The link between excess phosphates and algal blooms is an easy one to understand — hence a horde of laundry detergents now boasting to be 'phosphate-free'. But how significant is the contribution of phosphates from detergents, and is removing them from detergents the answer?

As phosphorus is such a ubiquitous substance, its sources are widespread. Scientists tend to divide the sources ending up in waterways into 'point' and 'diffuse' — that is, easily identifiable points of entry such as

treated sewage water and industrial waste, and less controllable, less direct means of entry such as run-off from fertilised land and animal excreta.

Phosphorus from sources such as human sewage and detergents gets into waterways from sewage treatment works — many sewerage plants can't remove the bulk of phosphorus from sewage. The exact percentage of phosphorus in waterways that comes from detergents is disputed, but about a third of the total discharged from sewage treatment plants is a generally agreed figure for Australia. The proportion this makes up of total phosphorus discharged into waterways depends on the other sources. While we haven't come across a figure for Australia, a United Nations paper puts the average figure for the EEC at 15%. In the UK, one report suggests a similar figure, with the following breakdown:

- Detergents: 17%.
- Human sewage: 30%.
- Animal excreta: 25%.
- Fertiliser run-off: 20%.
- Industry: 8%.

considering at 35 cents per wash. AMWAY S&B PLUS worked out the most expensive at 58 cents per wash.

RECOMMENDATIONS

Any of the detergents in the top-performing group (86%-90% soil removal) will give you a good clean wash. We've come up with two *What to buy* lists, one each for cold and warm water. In both cases the difference in soil removal among the top performers was only a range of about 3% — almost certainly not noticeable to the naked eye — so we've listed them in order of cost per wash.

WHAT TO BUY

In order of cost per wash	(cents)
FOR COLD WASHING	
BIO-Z (EZ)	29
RADIANT	35
DRIVE POWER SCOOP (EZ)	38
DRIVE (E)	46
AMWAY S&B PLUS (E)	58
FOR WARM WASHING	
BIO-Z (EZ)	29
RADIANT	35
equal COLD POWER	38
DRIVE POWER SCOOP (EZ)	38
DYNAMO (E)	45
DRIVE (E)	46
AMWAY S&B PLUS (E)	58
E — Contains enzymes	
Z — Contains zeolites	

So reducing the phosphate content of detergents would certainly ease the load on waterways, but it's by no means the only source, and not even the largest contributor. The Blue-Green Algae Task Force set up to investigate the causes of algal bloom suggested reducing the phosphorus content of detergents to 5% by weight. It also suggested looking at increased phosphorus removal at sewage treatment plants, reduced use of fertilisers — and much more research.

Removing more phosphorus at sewage treatment plants would tackle the whole of the phosphorus content of sewage waste, not just the part blamed on detergents. This looks an even better proposition when you consider the proposed 5% limit is just 0.2% below the current average phosphorus content in detergents sold in Australia. Is a 0.2% reduction significant enough?

Reports relate differing experiences in Europe: "In Sweden, sewage treatment has been upgraded and detergent phosphates are encouraged. Result — clean water. In Italy, detergent phosphates are prohibited and they have done little or nothing to upgrade sewage treatment. Result — no water quality improvement."

If manufacturers were required to state

on the packaging the percentage of phosphorus by weight, consumers could at least avoid the higher levels if they wished.

ALTERNATIVES — A WORD OF CAUTION

Are phosphate-free detergents any better for the environment than ones with phosphates? This is a rather touchy question. They may be free of phosphates — but you need to ask what *is* in the products. Generally speaking, their replacements are a wild card.

Phosphates aren't just added for fun, so when they're removed substitutes are added to avoid compromising performance. While the impact of phosphates on the environment is beginning to be understood, the effect of proposed alternatives is not:

"These potential STPP [phosphate] replacements have serious implications for the environment and public health. The removal of these potential STPP replacements in sewage treatments is important..." — Imperial College, London.

"A full evaluation of the ecological impact of formulations in which STPP has been replaced by zeolite and/or other substitutes has not yet been possible, and is still a controversial issue..." — United Nations report.

WHAT'S IN A LAUNDRY DETERGENT?

■ **Surfactant:** Short for surface active agent, this is the main cleaning muscle. It breaks the surface tension of water, allowing it to wet the fibres. The surfactant also aids emulsification of fatty substances — small globules are formed, which can be washed away.

■ **'Builders':** These improve the surfactant's performance in several ways — by softening hard water, which interferes with cleaning; by helping keep the optimum pH level for the detergent to work in; by keeping the dirt removed from the fabric suspended in the water rather than redeposited on the clothes ('anti-redeposition agents'); by breaking up dirt and removing stains; and by helping to keep the powder free-flowing. Phosphates have been most commonly used in these roles, particularly sodium tripolyphosphate (STPP).

Zeolites are synthetic compounds (sodium aluminosilicates in detergents) which can be used as builders instead of phosphates. However, they can't fulfil all the roles of phosphates and need to be supplemented by 'co-builders'. Like phosphates, zeolites are non-toxic, but their impact on the environment is not completely understood — see *Phos-*

phates — better the devil you know! below for more discussion of the environmental implications.

■ **Bleaching agents:** Sodium perborate and sodium percarbonate are commonly used to attack stubborn stains. Sodium perborate works best at warmer temperatures, so with the trend towards cold washing, **bleach activators** may be added to maintain bleaching power. The activator reacts with the major bleaching agent to form a second bleach, which is effective at lower temperatures.

■ **Whitening agents:** Also called optical brighteners, these reduce yellowing by absorbing ultraviolet light and retransmitting energy in the form of blue light — which makes white fabrics look even whiter. They don't actually clean clothes.

■ **Other additives:** Fillers help the smooth flowing of the powder; there's less of them in 'concentrated' products. Foam controllers prevent mountains of suds which would reduce the effectiveness of the detergent (and help avoid foaming rivers). Perfumes and colourants may also be added to make the product more appealing.

For instance, zeolites, the builder we've looked at in this article, are generally regarded as quite safe — but can only partially replace STPP and must be used in conjunction with other builders, referred to as 'co-builders'. These include substances such as polycarboxylates, which are only partially biodegradable. However, they and zeolites will mostly be removed by sewage treatment plants, unlike phosphorus.

I WASH THEREFORE I POLLUTE?

Phosphates aren't the only environmental problem posed by detergents — biodegradability is another, for example. How much of the detergent breaks down over how long, and into what? While the argument over laundry detergents rages on, what can you do in the meantime to minimise their environmental impact? We suggest:

- Wash in cold water.
- Don't use more than the stated dose; it won't make your clothes cleaner and whatever the detergent contains, it will increase the load on the environment.
- Only wash when you have a full load to reduce both use of resources and adding detergents to waterways.

LAUNDRY DETERGENTS

	1			2	3		
	Brand/type (in order of cost per wash within washing performance groups)	Manufacturer/ distributor	Origin	Size purchased (kg)	Number of washes per pack	Price (\$)*	OK for front loaders?
Cold water wash	86%–90% SOIL REMOVAL						
	BIO-Z advanced concentrate (A)	Kao Corp	Taiwan	1.5	26	6.98 / 9.20	✓
	RADIANT super-strength granules	Cussons	Australia	1	12	3.88 / 5.99	
	DRIVE POWER SCOOP concentrated powder	L&K: Rexona	USA	1	15	4.99 / 6.79	
	DRIVE powder detergent	L&K: Rexona	New Zealand	1	8	3.65 / 5.19	
	AMWAY SA8 PLUS powder detergent	Amway Australia	USA	1	17	10.25	✓
	81%–85% SOIL REMOVAL						
	SURF powder detergent	L&K: Rexona	Australia	1	9	1.99 / 3.19	
	COLD POWER powder detergent	Colgate-Palmolive	Australia	1	8	2.99 / 5.19	
	DYNAMO super concentrate	Colgate-Palmolive	China	1	12	4.44 / 7.10	✓
76%–80% SOIL REMOVAL							
OMO MICRO concentrated powder	L&K: Rexona	not stated	0.75	11	3.89 / 4.49		
Warm water wash	86%–90% SOIL REMOVAL						
	BIO-Z advanced concentrate (A)	Kao Corp	Taiwan	1.5	26	6.98 / 9.20	✓
	RADIANT super-strength granules	Cussons	Australia	1	12	3.88 / 5.99	
	COLD POWER powder detergent	Colgate-Palmolive	Australia	1	8	2.99 / 5.19	
	DRIVE POWER SCOOP concentrated powder	L&K: Rexona	USA	1	15	4.99 / 6.79	
	DYNAMO super concentrate	Colgate-Palmolive	China	1	12	4.44 / 7.10	✓
	DRIVE powder detergent	L&K: Rexona	New Zealand	1	8	3.65 / 5.19	
	AMWAY SA8 PLUS powder detergent	Amway Australia	USA	1	17	10.25	✓
	81%–85% SOIL REMOVAL						
	SURF powder detergent	L&K: Rexona	Australia	1	9	1.99 / 3.19	
OMO MICRO concentrated powder	L&K: Rexona	not stated	0.75	11	3.89 / 4.49		

* Lowest and highest prices found in checks over 24 weeks at the end of 1992 (pricing information from AGB BrandScan).

(A) This product's full name is BIO-ZET, but as you can see from the photo on page 9, BIO-Z is what you'll see on the packet, so we've used this form throughout for easy recognition.

1 SOIL REMOVAL

The percentage score for soil removal is achieved by relating the dirt removal rating for each detergent to CHOICE's 'best wash' results — readings after six washes in a consistently high-ranking detergent. This 'best wash' result is considered to be 100% soil removal.

We used specially soiled swatches for a consistent comparison — the swatches were stained with general soil, light oil, protein and heavy mineral oil. We also used crimplene swatches to measure whiteness retention. These were all attached to garments to mimic a normal wash, plus we added an extra dose of dirt in the form of a towel specially soiled with 'standard soil' and synthetic sebum — to stand in for skin oil which ends up on shirt collars. The dirt level of the swatches was measured before and after washing using a spectrophotometer.

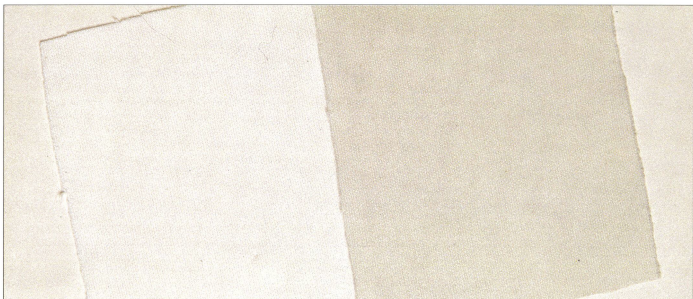
2 PRICE/COST PER WASH

Cost per wash is based on the average of thousands of prices collected over 24 weeks, and the number of washes in each pack (in Sydney water — check the packet for dosage directions if your water is harder). As you can see in the 'price' column, shopping around for your laundry detergent definitely pays off — some prices varied by over \$2 per packet for the same product.

3 OK FOR FRONT LOADERS?

As our regular tests on washing machines show (the latest report was in January 1993), front loaders are generally more water and energy-efficient than top loaders. However, they need a low-sudsing detergent, and not all on the market are suitable. Some packets suggest using a reduced dose for front loaders; if the packaging doesn't say "suitable for front loaders" or suggest a dosage, we'd advise against using it in a front-loading machine.

Contains enzymes	Contains zeolites	Contains phosphates	Cost per wash (cents)	Brand/type (in order of cost per wash within washing performance groups)
✓	✓		29	86%–90% SOIL REMOVAL
				BIO-Z advanced concentrate (A)
		✓	35	RADIANT super-strength granules
✓	✓		38	DRIVE POWER SCOOP concentrated powder
✓		✓	46	DRIVE powder detergent
✓		✓	58	AMWAY SA8 PLUS powder detergent
				81%–85% SOIL REMOVAL
		✓	26	SURF powder detergent
		✓	38	COLD POWER powder detergent
✓	✓	3	45	DYNAMO super concentrate
				76%–80% SOIL REMOVAL
	✓		34	OMO MICRO concentrated powder
				86%–90% SOIL REMOVAL
✓	✓		29	BIO-Z advanced concentrate (A)
		✓	35	RADIANT super-strength granules
		✓	38	COLD POWER powder detergent
✓	✓		38	DRIVE POWER SCOOP concentrated powder
✓	✓	3	45	DYNAMO super concentrate
✓		✓	46	DRIVE powder detergent
✓		✓	58	AMWAY SA8 PLUS powder detergent
				81%–85% SOIL REMOVAL
		✓	26	SURF powder detergent
	✓		34	OMO MICRO concentrated powder



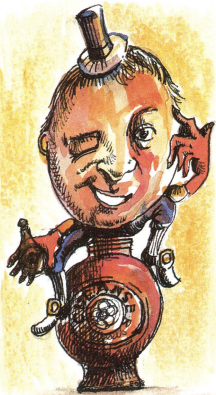
You don't need a spectrophotometer to see the difference in performance between the CHOICE 'Best Wash' (left) and a detergent that only manages 81%–85% dirt removal — in this case Surf, which doesn't contain enzymes. In all but one case, detergents with enzymes achieved 86%–90% soil removal.

BEAUTY

and the beasts

The 'no animal testing' bandwagon is becoming increasingly crowded, but have they all bought their ticket, or are some cosmetics companies free-riding?

WHEN I USE a word," Humpty Dumpty said ... "It means just what I choose it to mean — neither more nor less." Lewis Carroll, *Alice Through the Looking-Glass*.



He could easily be speaking on behalf of the growing number of cosmetics companies which use claims such as "not tested on animals" or "cruelty-free" — phrases which can 'mean' all sorts of things. They can mean the *cosmetic* was not tested but the ingredients were. Or the cosmetics company did not test in-house on animals but contracted an outside laboratory. Some ingredients may not have been tested on animals for a while — but almost every one will have at some time, some even just beyond five years ago (the 'rolling five-year rule' described opposite). Base ingredients might also be used in other industries such as pharmaceuticals or household chemicals. So while a company might truthfully say an ingredient has not been tested for the cosmetics industry, its safety might have been established by animal tests nonetheless.

"The question is," said Alice, "whether you can make words mean so many different things".

Some involved in the debate say no — that phrases like "not tested on animals" should be banned because they are confusing at best and misused at worst. But many consumers want to know where an effort has at least been made to avoid animal-tested ingredients. Is there a way round the dilemma?

Why do they still test on animals?

"The real reason for not testing on animals is ethics. But we'll never win on that one, we are such a cruel species." — Elizabeth Ahlston, president, Australian Association for Humane Research.

The term 'cosmetic' covers a diverse range of products like shampoos, skin care and deodorants — not just facepaint such as lipstick and eyeshadow.

Very little — if any — testing of cosmetics on animals goes on in Australia — in fact it's banned in Queensland and Victoria. Most testing seems to go on in the US, where a number of the large cosmetics companies are based. American consumers are quick to sue and this is said to be the main motivator in continuing to use animals — the companies believe they'd have a better case in a safety suit if they could show they'd tested a product on animals. Publicly they state that for some tests nothing yet will replace animals and they are not prepared to compromise safety.

Another factor in the perceived commercial need to keep testing on animals is the constant drive for new — so-called better — ingredients. Take Procter & Gamble's position, for example:

"Animal tests are difficult, expensive and time-consuming, and we would rather not use them at all... [but] the strength of our business depends on developing totally new ingredients that people have never used in any form. In these cases, we need to simulate how these products will respond when used by people. We will not compromise human safety, so sometimes we must use animal testing."

The thousands of ingredients already available and accepted as safe for human use do not need repeated testing.

Contrary to popular belief, the US FDA (Food and Drug Administration —



the government body dealing with regulation of cosmetics) does not specify the use of animals; instead it asks for proof of "the best available means for determining safety". It could well be, however, that in many cases, as far as the FDA is concerned, this amounts to animal testing. So 'validation' has become the buzzword for alternatives to animal testing — results from many laboratories must be gathered and seen to match up before all cosmetics companies will rely on them and the FDA will accept them as proof of safety. Many large companies donate to organisations like the Johns Hopkins Centre in the US, which is researching alternatives. Its catch-phrase is the 'three Rs — reduction, refinement and replacement': reduction in the numbers of animals used; refinement of tests to minimise pain and discomfort, including use of painkillers and tranquillisers in some cases; and replacement of methods using animals.

A profusion of policies

On a black and white scale of animal testing at one end and alternative methods at the other, there are probably a few companies at both ends, but an awful lot in the grey area in the middle. As Jacqui Kent of Animal Liberation says, "People ask us why we don't publish a list of companies which do test on animals. It's impossible to police and keep checking, and unfair to pick out some companies and not others — quite apart from the fact the list would fill a toilet roll."

These are the various stances taken by the industry and by campaigners:

■ **Ingredients declared by the 1978 EEC directive to be safe for human use and needing no further testing.** Companies such as Montagne Jeunesse base their formulations on this list. Although many of the ingredients may have been tested on animals at some time, you could call this a 'purist' stance in some ways, especially as it usually restricts the use of new ingredients which come onto the market only after animal tests have established their safety.

■ **Cut-off date.** Under this policy, a company says it won't use ingredients which have been tested on animals after a certain date, for example 1985. This is Blackmores' stance: "All ingredients have been tested on animals at some time or other. If you said you didn't use any ingredients which had ever been tested on animals, you couldn't use anything, but you've got to draw the line somewhere," says its product development manager, Bob Dean. He says it means turning down new ingredients even when they look interesting.

■ **Five-year rolling cut-off.** This is a popular policy, adopted by perceived leaders such as The Body Shop and supported by animal rights groups such as BUAV (British Union Against Vivisection). Such companies will not use any ingredient which has been tested on animals over the past five years. Some people point out all this means is that every year a new set of ingredients becomes available to these companies — the ones tested six years earlier.

"A cynical commentator might conclude that the 'rolling five-year rule' is

simply a device to permit 'cruelty-free' companies to use relatively new ingredients, developed and tested by others, without appearing to compromise their public stance against animal experimentation." — Michael Balls, president of FRAME (Fund for the Replacement of Animals in Medical Experiments).

The Body Shop believes its five-year rule is the most effective way to pressure companies to stop testing on animals: "A fixed cut-off date as used by other companies ... gives no incentive for a supplier to change its current practice," it says. "On the other hand, offering the opportunity to supply The Body Shop in five years' time is a strong moral and economic incentive to stop testing immediately."

■ **The latest Beauty Without Cruelty/Animal Liberation list.** To make it onto this list, companies have to sign a statutory declaration after answering a number of questions — the basic idea is that no animal tests have been used in formulating the product. The statement used to refer to the past 12 months, but Animal Liberation has changed its criterion to a cut-off date of 1985. A few companies have come off the list because of this. The Body Shop is still included despite publicly subscribing to the 'rolling five-year rule' — neither the Body Shop nor Animal Liberation could explain this discrepancy.

■ **Ingredients may be tested but not the finished product.** This is all some companies will claim, using words such as "this product was not tested on animals". Although the Australian Association for Humane Research says it sup-



THE TESTS

COSMETIC INGREDIENTS are tested for potential to cause irritation and allergic reactions, and in some cases cancer. When using animals, their reactions to substances, usually administered in higher doses than would be used on humans, are recorded and the results extrapolated for humans. Common animals used are mice, rats, rabbits and guinea pigs. Attention is often focused on two particular tests — the Draize eye test and the LD50 — but fortunately they are not used now as much as previously.

■ The aim of the **LD50** test is to find the dose of the substance being tested at which half the sample of animals dies — hence the name 'lethal dose 50%'. The substance may be fed by mouth or intravenously and the classic LD50 requires at least 50 animals for a statistically viable value.

■ For the **Draize eye test** substances are placed in the lower lid of a rabbit's eye, which is then observed for signs of damage — be it ulceration, clouding of the cornea or inflammation of the tissue surrounding the eye.

ports the Animal Liberation list, it is also sympathetic with this stance, as it believes it's too much to expect a company to guarantee none of the ingredients has been tested on animals. It's a pragmatic approach that doesn't make life too hard for the industry, because nearly every ingredient somewhere along the line will have been tested on an animal — if not for the cosmetics industry, then for another.

It doesn't help that the animal interest groups can't agree on which policy to back. But they and the cosmetics companies agree on one thing: there is a trend away from using animals and towards alternative methods of testing — alternatives which many scientists working in the field consider are at the very least safe enough.

So what are the alternatives?

"The problem is a scientific one, and I believe it is up to us to find the solution. By us, I mean scientists within the cosmetic industry [and] toxicologists prepared to break out of the straitjacket represented by conventional check-list toxicity testing in animals." — Michael Balls, FRAME.

A number of companies are testing cosmetics ingredients without resorting to animals. Sometimes these alternatives have to be used in combination to get all the data needed. For instance, FRAME suggests a five-step replacement of the Draize eye test, including Eyetex, neutral red viability tests and CAM — all of which are described below. Even many of the large companies who still test on animals are putting money into developing alternatives, and we would guess they'd all be using some sorts of alternatives, at least for screening substances before using animals. Of the following

list, Eyetex and Skintex are used in Australia, along with some human testing.

■ **Eyetex** uses a protein substance to predict irritation to the eye. The raw material is placed in contact with a special mixture of vegetable proteins in solution which mimic corneal clouding. The degree of damage — denaturing — to the protein, indicated by the change in opacity, is measured and the material given an irritancy score.

■ **Skintex** is similar to Eyetex but the effect of the test substance on the protein and another material — a 'reagent' — is measured by a change in colour.

■ **Cell culture.** Damage to the whole body may occur when on a smaller scale cells are injured or killed. So it follows that if you can observe reactions on the microscopic level, you can predict the overall response on the larger scale. This is the principle of testing materials with cell cultures — cell survival rates, growth rates, changes in cell size and shape and so on can be measured.

■ **Human volunteers.** Montagne Jeunesse, a UK-based company, runs human volunteer panels to test for allergies and irritancies. When it publicised a project in Australia with the help of the RSPCA, it received around 5000 responses from willing volunteers. The first batch of testing took place in January with 25 — unpaid — volunteers who bared backs for six products each. The Body Shop and Blackmores also use human testing to complement Eyetex and Skintex. Blackmores' Bob Dean says the combination gives good enough results without the need to test on animals.

■ **Skin culture.** An American company called Advanced Tissue Sciences sells two skin kits for testing — the Dermal Model and the Full Thickness Model. The first consists of nylon mesh squares

onto which a type of human skin cell — fibroblasts — found in the inner skin layer, the dermis, is grown. The second model is similar, but includes human keratinocytes as well (basic skin cells found in the epidermis, the skin's outer layer).

The squares of skin culture are placed in wells of diluted test material and incubated for 18-24 hours. Toxicity is measured by a number of indicators, including the uptake of dyes and the release of other substances by the cells.

■ **CAM.** The Chorioallantoic Membrane Vascular Assay (CAM or CAMVA) uses fertilised chicken eggs. A small window is cut away in the eggshell to reveal the chorioallantoic membrane (CAM), an embryonic structure described as 'well vascularised' — that is, with plenty of blood vessels. The test substance is applied inside a tiny teflon ring, and the CAM observed for changes 30 minutes later. Testers look for haemorrhaging, engorged blood vessels or 'ghost' vessels — ones without any blood. Unlike a number of alternative tests, this method has the advantage of allowing tests of substances which aren't water soluble as well as those which are. The effect of chemicals on blood vessels is crucial as these have an important role in the inflammation response.

■ **Neutral red absorption.** A dye called neutral red is one of several actively taken up by healthy cells — the healthier they are, the more they take up. In the case of neutral red, it's transported into a cell structure called a lysosome. Substances such as surfactants in detergents cause irritation by interacting with the cell membrane, which then can't perform as it's meant to, and this in turn impairs the lysosome. This indicator could be used with cell cultures or skin cultures.

Adapted versions of both these tests might use fewer animals and may not be quite as severe, but the principles are similar. The .D50 may be on its way out but other lethal tests are still performed.

■ **Other tests** include shaving an animal's fur in one area and thickly applying the substance in question. In an effort to increase the possibility of absorption into the body, the bare skin is sometimes abraded too.

Rats are used for oral toxicity tests because they have no mechanism for vomiting. "They routinely survive the test, but must be sacrificed for necropsy [an autopsy] and histological examination [looking at the cells] of the internal organs," writes a textbook on cosmetic safety.

Two types of test can be performed: acute — a single application; and chronic — repeated doses (over 28 days, for instance).

No-one wants dangerous cosmetics. But there are ways to assess safety that don't use animals, which many scientists working in the field consider are at the very least safe enough. Added to that, not everyone agrees animal testing is all it's jacked up to be: differences

in metabolism, skin structure and even the fact that a substance might be poisonous to one species and not another mean animal testing cannot *guarantee* there'll be no adverse effects in humans.

And are they looking at the right doses? "While we may need to assess what might happen if a child ate the contents of a jar of cold cream ... or drank the contents of a bottle of shampoo, do we need to know what might happen if children were allowed to progressively eat and drink their way along the shelves of the cosmetics and toiletries section of a supermarket?" — Michael Balls, FRAME

Toxicity tests on animals often use substances in concentrations 100 times, 1000 or even 10 000 times the dose humans would be exposed to. Substances have very different effects according to the dose; it's not just a matter of more severe reactions with higher doses. Weak toxic effects can be quite different from reactions to very high doses — or as another critic of current practices chose to describe it, "One ripe Victoria plum is a gustatory delight, but one kilogram is severe diarrhoea."

■ **Microtox.** This uses bacteria — so is criticised as being even less relevant to humans than animal testing. But defenders say the test measures basic biological functions which occur in higher organisms (including humans), as well as in lower orders like bacteria. And using bacteria doesn't pose the same ethical problems as animals.

The Microtox kit measures toxicity by the effect of a substance on the light output of luminescent bacteria. Once the necessary equipment is purchased, it is quick, cheap and extremely sensitive — allowing grading of even relatively mild substances.

So what can you do?

Clearly, buying products with ingredients that have never been tested on animals is high on impossible. But what can you do if you want to support companies which are distancing themselves from animal testing — in real terms, not just marketing ones?

1 The Beauty Without Cruelty list (below) is a good starting point. Companies have to answer questions referring to testing with animals by themselves, a parent or subsidiary company as well as suppliers. Active policing is impossible, but many feel that although it is not perfect, it is the best list available at present.

2 If a company claims not to test on animals, don't take the marketing claims at face value — quiz it as to its exact policy: ■ Turning the question around may illicit a more interesting answer — ask "How do you ensure the safety of your products?" (A toxicologist we spoke to believes some companies who claim 'not tested on animals' do so legitimately because they do no testing at all! Perhaps they use 'safe lists'? Perhaps not? But that's another story...)

■ Ask what alternative methods it uses — for instance, Eyetex or Skintex, or maybe some human volunteers.

■ Ask in what ways — if any — it supports research into and validation of alternatives.

This should give you enough information on the stance of a company — and its willingness to be involved in the debate — to make up your own mind.

3 The large companies have a key role in replacing the use of animals and some have played an important part in developing alternatives. Their response so far in reducing the numbers of animals used is because of public pressure. If the pressure is kept up, the search for and validation of alternatives will be quicker. How you apply pressure is up to you — some consumers will want to go as far as boycotting products, others may feel letters or even petitions are a better option.

4 As far as individual products are concerned, avoiding the new/better/best ones will mean you avoid products likely to be involved with recent animal tests.

BEAUTY WITHOUT CRUELTY 'PREFERRED PRODUCTS' LIST

The manufacturers of these products have declared to BWC that no animal testing is carried out during development of or on the finished product (as at October 1992).

A Fragrant Affair
Ahimsa Products
Aloe Vera
Aloe Vital
Andre Duvani Products
Aurium
Aurora Products
Australian Wildflower
Incense & Perfumes
Avroy Shlain
Barry M
Beauty Without Cruelty
Cosmetics
Big Bubble
Biokosma
Blackmores
Body Aware
Body Shop
Briggs Herbal Creams
Brot Bodyline
Caring Products
Cenovis Skin Care Range

Classics
Clover Fields
Colourings
Aloe Vera
Completely Natural
Cosmetics
Corvita Products
Creightons
Curacel Cosmetics
Dalliance Cosmetics
De Lorenzo Natural Hair
Cosmetics
Desert Essence
Dial
Dragon Wisdom
Dr Hauschka Skin Products
Ecol Products
Elleebana
Elisha Lander Products
Eis Cosmetics
Emet
Evanol Hair Dyes
Ever Bilena Cosmetics

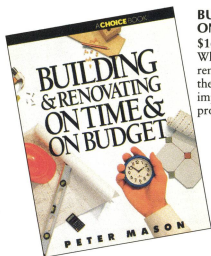
Everyday Rainwater Soft
shampoos & conditioners
Evoke
Floriss of London Toiletries
Fragrant Craft Supplies
Fragrant Delights
Geisha Cosmetics
Genetix
Golden Wattle (bee pollen)
Grace Cosmetics
Greenridge Botanicals
Healtheries of New Zealand
Healthways Holdings (NZ)
Helen Helms Natural
Skin Care
Herbion Products
Heritage Products
Hoffels
Hymosa
In Essence Products
Innox Cosmetics
Janessa Natural Skincare

Jean Aureille Cosmetics
Josephine Cosmetics
Jurlique Cosmetics
Karisma Cosmetics
KMS Professional Haircare
Lange Hair and Skin Care
L'Arôme
Le Crystal Natural Deodorant
Lechner Cosmetics
Luminance
Meltone Products
Mill Valley Int.
Montagne Jeunesse
Monastich Products
Moritz (Nature's Sunshine)
Mudgee Honey Co.
Natalie
Natural-Oil Workers Co-op
Naturals
Nature Spirit
Nature's Skin Massage &
Essential Oils

Nature's Fruit
Nature's Herb
Nutrimetics
Organics
Passion Incense
Paul Penders Cosmetics
Priscilla Clarke Natural
Skin Care
Pure
Rachel Perry
Rainbow Herb & Flower
Remedies
Ramboldes Farm
Rocherche
Red Earth
Reneetov
Rivendell Farm
Rose of Lilies
Rosewood Oils & Lotions
Sharys Products
Sensual Delights Products
Shahnaz — Herbal
Sonning Wildflower
Soywax Creams
Soma Skin
Spiritual Sky/Bare Nature
Starlet

Sun Art Aromatic Oils
Swami Sarasvati
Tania
Tapien Ari
The Oil Garden
The Clay Company
The First Australian
Organic Oil
Tao Aromassage Oils
Tasmanian Soaps and
Toiletries
Thursdays Plantation
Products
Tiki Products
Tinderbox Products
TLC (was Doctors' Choice)
Toms
Tri-Natural
Tri-Nature
Tru-Alo
Truly Natural
Wattle Creek Herbal
Products
Wielda
Wildcrafted Herbal Products
Yardley

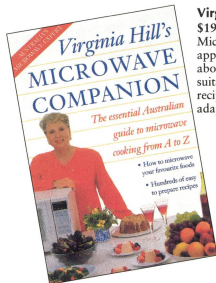
CONSUMER BOOKSHELF



BUILDING AND RENOVATING ON TIME AND ON BUDGET

\$16.95 paperback 137pp

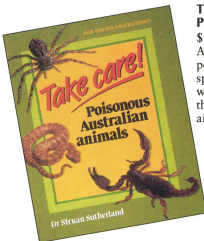
What should happen during building or renovation jobs, and the best ways of directing the people you employ to build, maintain or improve your home. Clear checklists for common projects are given.



Virginia Hill's MICROWAVE COMPANION

\$19.95 paperback 322pp

Microwave ovens are a boon when they are used appropriately. This book is very informative about microwave cooking techniques, and suitable accessories and utensils. It includes recipes for many traditional favourite dishes adapted to microwave cooking (even playdough!).



TAKE CARE! POISONOUS AUSTRALIAN ANIMALS

\$14.95 hardcover 64pp illustrated

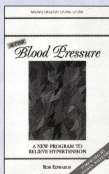
A handy reference work to the 26 most poisonous animals in Australia, including snakes, spiders and insects, and marine animals. It details where the species can be found, how to identify them and what to do about them, including first aid advice.



UNDERSTANDING MIGRAINE

\$9.95 paperback 101pp

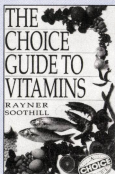
This book presents a clear account of current research on the causes of migraine, what triggers an attack, ways of managing migraine and available treatments, including the new drug, sumatriptan.



BETTER BLOOD PRESSURE

\$16.95 paperback 151pp

More and more Australians are realising they suffer from hypertension. This book offers a set of basic guidelines to lessen your risk of heart attack or stroke without taking all the joy out of living.



THE CHOICE GUIDE TO VITAMINS

\$16.95 paperback 189pp

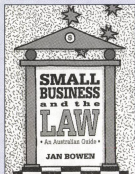
Straightforward and scientifically sound information on vitamins and minerals, how much of each we need, how to obtain them from our diet, and those which can be harmful.

A resource book for
Australian careers



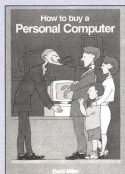
\$16.95 paperback 176pp

What will you do if a relative becomes ill or otherwise unable to live independently? This guide canvasses all the options available and their costs, and gives advice on how to choose between them, and their financial and legal implications.



\$24.95 paperback 198pp

Easy to read, this book is very much recommended for those starting out in small business. It gives a good background to the legalities that affect small business, and will certainly help you to make better use of your lawyer.



\$9.95 paperback 60pp

A popular guide, aimed at those with little prior knowledge of computers. This latest edition has new sections on Windows and other graphic-user interfaces, and memory. (Formerly entitled *How to Buy a Home Computer*.)

BOOK

BOOK		No.req'd	Price (\$)	Subtotal
Building & Ren. on Time & on Budget	(BUILDON)		16.95	
Virginia Hill's Microwave Companion	(MICRO)		19.95	
Take Care! Poisonous Australian Animals	(TAKECARE)		14.95	
Understanding Migraine	(UNMIGRAN)		9.95	
Better Blood Pressure	(BETTER)		16.95	
The CHOICE Guide to Vitamins	(VITAMINS)		16.95	
Caring for Older People	(CAREOLD)		16.95	
Small Business and the Law	(BUSLAW)		24.95	
How to Buy a Personal Computer	(HOMECOMP)		9.95	
Up the Ladder Without the Snakes	(LADDER)		19.95	
Winning Back the Cities*	(WINNING)		10.95	
The Survival Pest Pack	(PESTPACK)		15.00	
Study Skills for Successful Students	(SKILLS)		10.95	
Reader's Digest Gardener's Encyclopaedia	(GARDENC)		70.00	
Househunting	(HOUSHUNT)		14.95	
Preparing for Birth	(PREPARE2)		8.95	
Baby Games	(BABYGAME)		16.95	
Collecting Art	(COLLECT)		10.00	

* No charge for postage and handling

Plus post & handling (\$3.00 for one book plus \$1.20 for each extra book)

Folders (postage & handling included in price)

☐ _____ red (BR) ☐ _____ black (BBL) ☐ _____ brown (BBR) 12.00 _____
Qty Qty Qty

Boxholders (postage & handling included in price)

☐ _____ red (HR) ☐ _____ green (HG) ☐ _____ blue (HB) 12.00 _____
Qty Qty Qty

TOTAL \$

I enclose: cheque ☐ money order ☐ payable to the Australian Consumers' Association

OR: I wish to pay by: Mastercard ☐ VISA ☐ Bankcard ☐

Card no. / / Expiry date: /

Signature _____

Mr/Mrs/Miss/Ms _____
First name Last name

Address _____

Postcode

Phone (business hours) 1M9302 INS

SEND YOUR PAYMENT TO:

SEND YOUR FORM TO:
AUSTRALIAN CONSUMERS' ASSOCIATION
57 Carrington Road, Marrickville 2204.
Phone: (02) 558 0099 Fax: (02) 558 9341

POSTAGE & HANDLING

\$3.00 for one book plus \$1.20 for each extra book ordered. Some books may have to be sent separately to keep postage costs down. This is due to Australia Post's vagaries, not ours. Please allow 3 to 4 weeks for delivery. We process the vast majority of orders the day we receive them, but sometimes stock

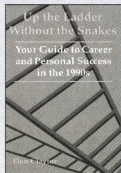
replenishment means a delay while we await delivery, so please bear with us. If any order cannot be filled for a substantial length of time, we'll let you know and give you the option of cancellation.

MONEY BACK GUARANTEE

If you are not completely satisfied with your purchase, return book(s) within 30 days for full refund of the purchase price.

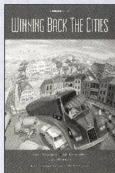
BINDERS

Folders hold 12 issues so you can leaf through a year of CHOICE, and come in red, black or brown.



UP THE LADDER WITHOUT THE SNAKES
\$19.95 paperback 159pp

A handbook to creating a successful career balanced with a fulfilling personal life. Questionnaires and worksheets are included to help you tailor a career plan and cope with challenges such as redundancy, mid-life crises and burn-out.



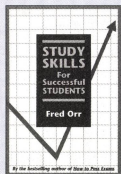
WINNING BACK THE CITIES
\$10.95 paperback 48pp illustrated

An attractive, illustrated primer to the ideas of Professor Peter Newman and Jeff Kenworthy of Murdoch University, involving urban villages, light rail links, and traffic calming — it provides an inspirational blueprint for a better urban future.



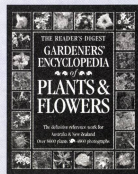
THE SURVIVAL PEST PACK A Consumer's Guide to Do-it-yourself Pest Inspections
\$15 paperback 70pp

This book will help you find and recognise the different types of pests which attack timber, and prevent infestations occurring in the first place. It also gives step-by-step instructions on what to do if you do find pests.



STUDY SKILLS FOR SUCCESSFUL STUDENTS
\$10.95 paperback 128pp

A practical and readable guide to improving all aspects of your approach to study — such as increasing your motivation and concentration, practising relaxation techniques, improving your listening and note-taking skills, becoming an efficient reader, and improving your essay-writing and exam skills.



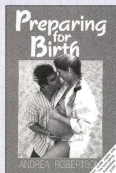
**THE READER'S DIGEST GARDENER'S
ENCYCLOPAEDIA OF PLANTS & FLOWERS**
\$70 hardcover 608pp illustrated

This valuable reference includes a catalogue listing plants by type (over 4000 of them illustrated in colour), categorising them further by height, colour of flowers/berries and season of flowering; also a descriptive dictionary of over 8000 plants and how to grow them. As well, there is useful information on planning gardens and choosing suitable plants.



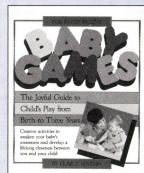
HOUSEHUNTING
\$14.95 paperback 141pp

A useful guide which takes you through all the steps of finding a property, arranging the finance, having the property inspected, the tips on buying at auction or by private sale, and the legal requirements.



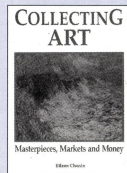
PREPARING FOR BIRTH
\$8.95 paperback 127pp

Accurate, concise information about birth options, obstetric intervention procedures and breastfeeding.



BABY GAMES
\$16.95 paperback 183pp

A wealth of imaginative ideas and songs to use when playing with your child (from birth to three years).



COLLECTING ART
\$10 paperback 162pp
A practical, illustrated guide to collecting art
in international and local markets.

KIDS' FRUIT SNACKS: SOMETHING TO CHEW OVER

Are fruit roll-ups, strips, fingers and snack packs as good for your children as eating a piece of fresh fruit?

FRESH FRUIT is a very successful traditional snack — does it really need new packaging to make kids eat it?

Lacking many of the hallmarks of modern processed foods, fresh fruit is low in fat (excluding the voluptuous avocado), modest in sugar, contains no cholesterol and little sodium. The packaging is all-natural and biodegradable too. It's also cheap to buy fresh fruit in season.

Why eat it at all? Fruit contains nutrients essential for healthy living, including vitamins C and folate, dietary fibre and magnesium. These all contribute to the body's well-being in a variety of ways.

But are the new fruit products aimed at the school lunchbox just as good? They offer convenient packaging and a longer shelf-life, so now you can always have some fruit on hand. They also look attractive to kids. And they're being promoted hard as substitutes for a piece of fresh fruit. We buy \$31 million worth of them each year.

We bought a range of these products and tested for vitamin C, fibre and sugar as well as checking on fat and sodium to see if there was any need for concern.

To keep comparisons simple we chose apple purées, peaches for the diced

products and apricot for the dried fruit slices, fingers and roll-ups (see the table overleaf for product details).

FRUIT SUBSTITUTES

What's in the new fruit products?

The diced fruit products included fruit juice (often pear juice), while the purées were just cooked and pulped fruit. The only listed additives were vitamin C for GOULBURN VALLEY and extra sugar for SPC SNACK PACK Peaches in light syrup.

Looking to the dehydrated products — fruit slices, roll-ups and fingers — there's more to catch the eye.

The products we tested — some are almost as nutritious as fresh fruit, but others are basically substitutes for lollies.



SERVE YOURSELF

Health authorities say we should aim to eat four serves of vegetables or fruit each day. How much is a serve of fruit?

- One piece of medium-sized fruit such as a banana, apple, orange, mango, pear; or
- Three pieces of smaller-sized fruit such as apricots, plums, figs; or
- One cup of berries — 20 grapes or 10 strawberries.

Fruit juices contain vitamins but frequently lack the fibre of whole fruit.

Figure 1. Vitamin C

Percentage of the recommended daily intake (RDI) of vitamin C for a child 8–15 years from one serve (eg one apple, one fruit strip) — in descending order of vitamin C content.

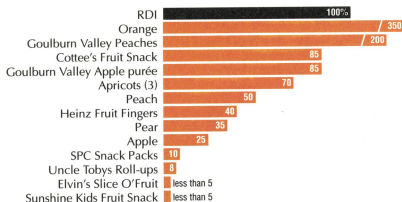
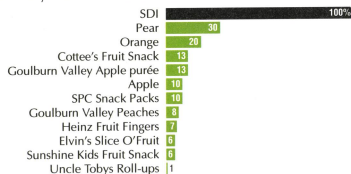


Figure 2. Fibre

Fibre from one serve (eg one apple, one fruit strip) as a percentage of the suggested adult daily intake (SDI) of fibre, in descending order of fibre content. No recommended amount has yet been set for children.



VALUE FOR MONEY

Prices vary for fresh fruit, of course — if you buy in bulk and in season it can be very cheap. We bought apples at 16 and 54 cents each from different shops when preparing this report.

But these processed fruit products won't exactly break the bank either. **SUNSHINE KIDS FRUIT SNACK** was the most expensive dried fruit product on our shopping list at 42 cents per strip. **COTTEE'S FRUIT SNACK** worked out at 71 cents per pack. They're cheaper than lollies.

SETTING BAD HABITS?

One of the Cottee's television ads showed children ridiculing another child who brought a piece of real fresh fruit to

school in his lunchbox. He is embarrassed by his lowly piece of fruit. The ad encourages kids (and parents?) to see processed and packaged fruit products as preferable to fresh fruit. We would take to task advertising which ridicules fresh fruit and tells children to feel embarrassed should a parent stick an apple in the lunch.

It's up to you whether you want your children to cultivate a taste for the convenience of the processed and expensively packaged product, or learn to appreciate fresh fruit in season. In these products' favour, though, if a processed fruit product replaces the candy bar (rather than the fresh fruit) in the school or kindergarten lunchbox — precisely because of its longer shelf-life and con-

venient packaging which make it easy to store — this seems a reasonable result.

CONCLUSION

Now you've got a choice in fruit products — but there are losers as well as winners from our test.

In the varieties tested, fruit snack packs containing diced or pureed fruit were similar nutritionally to fresh fruit of the same type and therefore represent a good alternative to fresh fruit. The price is comparable too if you buy fruit at the corner shop. **COTTEE'S FRUIT SNACK** and **GOULBURN VALLEY** have the edge over the three canned **SPC SNACK PACKS** tested, which had lost much of their vitamin C through processing.

The dehydrated fruit products proved to be low in vitamin C and marginally lower in fibre per serve than the pureed and diced fruits. They are more like sophisticated lollies than nutritional substitutes for fresh fruit. Even if you gave your child two of these to chew on, the vitamin C and fibre would still be lower on average than in an apple, pear or orange, for example. **UNCLE TOBY'S Roll-ups** have lower sugar and fibre per serve than the rest because there's less fruit in them.

The exception is **HEINZ FRUIT FINGERS**, with its vitamin C and added milk proteins which minimise the amount or effect of sugar sticking to your teeth. But they're intended for toddlers over 12 months rather than older children, who may not appreciate the taste.

If your child is asthmatic you may prefer not to give **HEINZ FRUIT FINGERS** due to the presence of carry-over sulphur dioxide.

WHAT TO BUY

Note: our results are for the fruit flavours/varieties actually tested. Nutrition profiles will differ according to the fruit used. Prices are those we paid in October 1992.

THUMBS UP	Price (\$)
If you're looking for a lunchbox filler, go for these:	
COTTEE'S FRUIT SNACK Apple fruit snack (pureed)	
	2.82 (pack of 4)
GOULBURN VALLEY Apple purée	0.65
GOULBURN VALLEY Peaches in natural fruit juice	0.68

MAYBE, FOR TODDLERS	Price (\$)
HEINZ FRUIT FINGERS Apricot	1.02 (pack of 3)

THUMBS DOWN	Price (\$)
ELVINS SLICE O' FRUIT Apricot	2.39 (pack of 6)
SUNSHINE KIDS FRUIT SNACK Apple apricot	2.08 (pack of 5)
UNCLE TOBY'S ROLL-UPS Chewy apricot rolls	2.97 (pack of 8)



CONSUMER IN LAW

THE TAXMAN AND YOU

In this age of self-assessment and data matching, the Australian Taxation Office is well equipped to keep tabs on your affairs. Understanding your rights and obligations as a taxpayer is more important than ever.



Q: What is omnipotent, omnipresent and has the whole nation in its hands?

A: Such words are usually reserved for describing God Almighty, but they could also be appropriate when referring to the all-powerful and ever-present Australian Taxation Office.

The Tax Office gets its far-reaching powers from the fact that the Commonwealth Government needs revenue to fulfil its obligations to the community. Without the taxes collected from households and businesses, the government would not have money to spend on public works, pensions, unemployment benefits and subsidies to the business sector (not to mention health, education, defence and other commitments).

Parliament has enacted laws which give the Commissioner of Taxation and his officers powers to help them do their work effectively, including, for example, the right to full and free access to buildings, places and documents when conducting audits.

But the Tax Office is not just a revenue collection agency. It also works with government departments on tax policy matters and, in recent years, it has been given the arduous job of collecting levies under various new government programs such as the Higher Education Contribution Scheme and the National Training Guarantee. It also administers the Child Support Scheme.

Its powers may enable it to maximise compliance with tax laws, but what about its stated aim to become a 'people-friendly' institution? If consumer complaints are any indication, it seems there's still room for improvement. The Tax Office is still one of the largest sources of complaints to the Commonwealth Ombudsman, although the level has remained fairly constant in recent years.

In this context, brushing up on your rights and obligations would be a wise move.

Q: So what are my basic obligations as a taxpayer?

A: Your most fundamental responsibilities are to declare all income, and to take reasonable care in preparing your tax return. This means making an honest attempt to get your tax affairs right the first time by keeping tax records and seeking suitable advice where appropriate. If you make an earnest attempt to follow Tax Pack instructions, you will generally be considered to have taken reasonable care.

Under the self-assessment regime that's been in place since 1986, the Tax Office works out your refund or tax bill based on the information you provide in your tax return. When you lodge a return you're asked to sign a declaration saying all the information it contains is true and correct and that you've included all your income for the year. You are responsible for ensuring the return contains no errors or omissions. If the return is subsequently shown to be incorrect, you're held personally responsible, even if a tax agent prepared the return.

Your return is not generally examined for errors or omissions before the Tax Office assesses how much tax you'll pay or what refund you'll receive. But after you've sent a notice of assessment, its computers continue to check for missing or incorrect information. Your tax return may also be examined in a substantiation audit or a desk audit (see below).

You must declare all income, including allowances, interest, dividends, benefits and other salary or wages, even if they're not shown on your group certificate or statement of earnings. The Tax Pack outlines what allowances, benefits and earnings you must include.

You can only claim certain expenses (allowable deductions) related to earning your income if you can prove you've actually spent the money on the item you are claiming for, which means having the proper records to support your claim. If you don't meet this requirement your claim could be disallowed and in some cases you could be penalised or prosecuted.

And don't forget to hold onto the records even after you've made a claim. If your total work-related expenses are \$300 or less, keep a diary of them and a record of how you calculated your claims. If the total is more than \$300, you must keep receipts, invoices or similar documentary records. Documentation to substantiate claims must be kept for three and a half years if you're an employee or seven years if you're self-employed.

Q: What happens when I become the subject of a Tax Office audit?

A: An audit involves examining your financial affairs to ensure your income tax returns are correct. An auditor has the power to require you to provide information for any of the purposes of the tax law. He or she can require you to produce books, documents, etc, or to attend the Tax Office and give evidence about your own or another person's income or assessment.

The Tax Office conducts two main types of audit on individual wage and salary earners and small business: desk audits and substantiation audits. A desk audit usually involves you going to the Tax Office, where a tax officer checks income and expense or rebate items in your return.

If a desk audit involves proving your claims for work, car or travel expenses, a schedule will be sent to you in advance so you can summarise and cross-reference your receipts and records for presentation at the interview. If you don't present your records in the correct format, your claims may be disallowed.

If you are the subject of a substantiation audit you must send the Tax Office receipts and other documents to prove work, car and travel expense claims made in your tax return. Substantiation audits are usually done by mail.

A third type of audit is the general audit, used to verify complex individual tax returns and most business returns. These audits, which involve a more thorough examination of the taxpayer's books of account, bank accounts and other records, may involve several interviews, which are often conducted at the business premises of the taxpayer.

If the Tax Office is going to audit you, you should receive notification in advance. You may choose to have your tax agent or accountant, lawyer or some other adviser involved. The auditor should act in a professional and courteous manner and show fairness and impartiality throughout the process.

You should be given reasonable time to collect records, documents and papers and to gather information in relation to any matter which arises during the audit. Any questions asked should be clear and unambiguous and you should be given reasonable assistance or explanation if required. Take notes of any conversations or at interviews and ask the auditor for a copy of his or her record of interview. Interviews can also be taped.

Q: What are my rights and responsibilities if the Tax Office says I owe it money?

A: If you receive a tax assessment notice which says you must pay more tax, you generally have 30 days from when the notice was issued to pay up. If you can't pay by the due date, contact the Tax Office, which may be able to give you extra time to pay, depending on your particular circumstances.

Before granting you an extension, the Tax Office will need to know what steps you've taken to find the money to meet your debt: for example, whether you've tried to borrow or sell assets. It will also need details of your financial position, your assets and liabilities and your income and living expenses. If you're granted extra time to pay, you will be penalised by additional tax, which is calculated at the rate of 8% per year of the amount to be paid plus interest, which is currently 9.6% per year.

If you don't pay by the due date but fail to contact the Tax Office, it will act to collect the amount owing. This may take the form of a garnishee notice requiring any person who pays you, owes you money, or who holds money for you, to send all or part of that money directly to the Tax Office. Alternatively it could start legal action to recover the amount you owe.

You must pay half your tax by the due date, even if you've lodged an objection against your assessment. If your objection is allowed, the tax will be reduced. You will also receive a refund of any amount you overpay plus interest. If you have been overcharged due to an obvious clerical error, contact the Tax Office and you won't have to pay.

You can apply for a release from payment if paying your tax bill would cause you serious hardship. To do this, you will need to obtain an application form from the Tax Office where you lodged your return. The application requires details of the amount of tax you want to be released from, your assets and liabilities, income and living expenses, and an explanation of why payment would cause serious hardship. The Tax Office may still take action to recover your unpaid tax even after you've lodged the application.

Q: What does the Tax Office know about me and what can I do if I think my privacy has been invaded?

A: The Tax Office is certainly able to cast a wide net when gathering information on its clients. The tax file number (TFN) system, implemented in 1989/90, was



designed to help detect undeclared income. It covers almost every taxpayer (including welfare recipients) and every organisation that borrows, raises or has money on deposit.

The universality of the TFN has enabled Commonwealth Government departments to introduce ways of checking their information against various other sources. The Data-matching Program (Assistance and Tax) Act 1990 provides the authority for a data-matching agency to match certain data held by the Australian Taxation Office, Departments of Social Security, Employment, Education and Training, Veterans' Affairs, and Health, Housing and Community Services.

The Tax Office uses this program to obtain information from the other government departments about allowances and benefits paid, including unemployment benefits, veterans' and age pensions and Austudy.

Employers are also required to report to the Tax Office details of salary, wage and other payments made. They also report the amount of tax taken out of those payments and details of payment of unused long-service leave made when an employee leaves the business.

Companies must report details of dividends paid and tax withheld on dividends, and financial institutions like banks and building societies must report details of interest payments made. Recently introduced cash transaction reporting arrangements also require financial institutions to report what they see as 'dubious' cash transactions, including all transactions over \$10 000, to the Tax Office. This information can be used in selecting taxpayers to be audited.

Details from reporting agencies are checked against the income you declare on your tax return. Deductions or rebates you claimed are also checked. The checking is done by computers (the In-

come Matching System), usually after your tax return has been assessed. The computers also find people who have not lodged a tax return when they should. If the Tax Office can confirm that you have not declared all your income or have made an incorrect deduction claim, it will send you an amended assessment and you may have to pay more tax or face prosecution.

The Commissioner of Taxation also has the authority to disclose information to an array of law enforcement agencies and royal commissions, where that information is relevant to establishing whether a serious criminal offence has been or is being committed.

These broad data collection powers are supposed to be countered by tax laws designed to protect the privacy of tax information. They make it an offence to wrongfully request, record or receive tax details, or to misuse or give that information to anyone who is not authorised to use it, and there are severe penalties for offenders. In addition, the Privacy Act protects personal information held by Commonwealth Government agencies. It also protects against misuse of tax file numbers, no matter who holds them.

Contact the Privacy Commissioner if you believe your rights have been breached.

Q: What penalties apply if the Tax Office discovers I have not fulfilled my legal obligations as a taxpayer?

A: You will have to pay penalties if you fail to put in a tax return when you should, and also if you have not returned the correct amount of taxable income and this is because you have not taken 'reasonable care' in the conduct of your tax affairs. This means making an honest attempt, consistent with your knowledge, experience, skill and other circumstances, to get your tax affairs right the first time. If you don't keep adequate records, for example, and as a result pay too little tax, you run the risk of being penalised for not having taken reasonable care.

Some taxpayers may also have to show that the positions they have taken in their returns are 'reasonably arguable', but this is only if a large amount of tax is involved (at least \$10 000).

The law sets out specific rates of penalty for tax law breaches. Although the rates of penalty are generally fixed, the Tax Office can increase or decrease them by set amounts depending on the circumstances.

In the past, if you paid your tax late, a 20% per annum penalty was charged.

This was reduced to 16% in October 1992. In the same way as when you apply for an extension of time to pay your tax, the penalty is actually a combined penalty and interest charge, but for the 1992/93 financial year the combined penalty and interest rates will be separated. This means that if you pay your tax late you will be charged a penalty of 8% per annum on the amount unpaid (to encourage you to pay the tax on time) plus an interest charge which represents the time value of the money.

If your assessment is amended to increase the amount of tax you have to pay, you will have to pay interest to the Tax Office on the amount of tax that has been underpaid in addition to that underpaid amount and any penalties.

Any interest you have to pay for the late payment or underpayment of tax will be calculated at an interest rate set from time to time by reference to the 13-week treasury note rate plus 4%. Under the new arrangements, if you do pay interest to the Tax Office for an underpayment or late payment of tax, you will be able to claim a deduction for the amount of interest paid in the year you actually pay the interest.

All taxpayers who have committed an offence can be prosecuted, but administrative penalties (fines) are often used instead. The Tax Office concentrates on prosecuting offences that are particularly serious, blatant or involve persistent offenders.

The Taxation (Interest on Overpayments) Act 1983 allows the Commissioner to pay interest on certain tax refunds if it's found you've overpaid tax.

Q: What can I do if I think the Tax Office has made a mistake?

A: If you think there's something wrong with your assessment, check all the details with your copy of the tax return. If you can't figure it out, contact the Tax Office. You have the right to object to the assessment if you think they've made a mistake. You must make your objection in writing and have four years after your notice of assessment was issued to make it.

You also have four years to ask for your tax return to be amended, but if you ask for an amendment you can't appeal against the Tax Office's decision and you won't be paid interest on any money owing.

If your notice of assessment shows you owe tax, you must still pay half by the due date even if you have lodged an objection or requested an amendment.

Address your objection to the Deputy Commissioner of Taxation at the Tax

Office that issued your notice of assessment. Give your tax file number and the assessment year. Make it clear that you object to the assessment (use the word 'object'), say what you consider to be wrong in your assessment and set out your reasons in detail. Attach copies of appropriate papers such as receipts. If difficult or complex issues are involved, you may wish to seek professional advice from your tax agent or solicitor first.

When you lodge an objection, the Tax Office may allow all of it, allow some of it or disallow it. If it is disallowed, reasons will be given.

In the past, as a preventative measure, the Tax Office has issued public rulings, advance opinions and other rulings about how the tax law may apply in certain circumstances. The problem with such rulings was that they were not legally binding. Rulings issued by the Tax Office are now legally binding if they are about arrangements that begin on or after July 1, 1992. There are two types: public rulings and private rulings.

Public rulings describe how the tax law applies to taxpayers in general or how the tax laws affect certain classes of arrangements — for example, the treatment of annuities. They apply to arrangements which began on or after July 1, 1992. Copies of public rulings are available from the Tax Office.

Private rulings apply to specific taxpayers about their own particular tax affairs. Private rulings are given in respect of how the tax law applies to an arrangement for a particular year or years. Private rulings have gradually been replacing advance opinions from July 1, 1992. If you are genuinely uncertain about your tax affairs, you can apply for such a ruling, which will be binding on the Tax Office. However, the Tax Office may also impose a penalty if you do not follow the ruling yourself when lodging a return or calculating your tax.

You can object and appeal against a private ruling in the same way you can object to your assessment. For example, if you're considering entering into a transaction, you can request a private ruling if you're unsure about the tax consequences. If you don't agree with the advice given in the ruling, you can have it reviewed before you enter into the transaction.

If you wish to have an objection decision reviewed by an independent body, you can appeal to the Administrative Appeals Tribunal or a court. You have 60 days to do so. And finally, if you're dissatisfied with any action of the Tax Office you can lodge a written complaint with the Commonwealth Ombudsman. □

Announcing The 7th CHOICE Subscriber Draw For new CHOICE subscriptions and renewals received January 1 to March 31, 1993.

On April 1 we'll be holding our seventh Subscriber Draw. The lucky winner will be able to choose any two products from the following tests published July 1992 to September 1992.

- ☐ Cellular phones (July '92)
- ☐ Electric frypans (August '92)
- ☐ Colour televisions (July '92)
- ☐ 300-350L refrigerators (September '92)



These are products we bought for testing (we never take manufacturers' samples), so you won't be the first to turn them on or set them up. But we'll cover any service problems with a CHOICE warranty that'll match the manufacturers' — just as if you'd bought them new.

All new CHOICE subscriptions and renewals received from members and personal subscribers (including donors of gift subscriptions) by March 31 will go into the draw, unless of course you indicate you don't want to be included.

(If you're not due to renew your subscription during the period, don't worry, we'll be holding other draws during the year — your renewal notice will have the details.)

The perfect gift

Here's where you stop racking your brains for the right present. With a CHOICE of their own, your friends can make big savings (and you may get to keep your own copy!).

And every new CHOICE subscription you give or renew for someone else means an extra entry for you in the Subscriber Draw. Give two gifts, gain two extra entries. Give three, and you've tripled your chances.

Use the order form overleaf

CONDITIONS OF ENTRY

1. The winner will be drawn from new subscriptions and renewals from personal subscribers (including members and donors of gift subscriptions) received January 1 to March 31, 1993. If you renew or subscribe for two years, you get two chances to win.
2. Information on how to enter and prizes form part of these conditions of entry.
3. Employees, and their immediate families, of the Australian Consumers' Association and its associated companies and agencies are ineligible to enter.
4. Entrants must be residents of Australia.
5. Applications are subject to a verification check and judge's decision is final. No correspondence will be entered into.
6. The prizes will be delivered free anywhere within Australia.
7. Prizes cannot be taken as cash.
8. South Australian residents may enter the draw by completing the form and posting to: Reply Paid No. 13, ACA, 57 Carrington Road, Marrickville NSW 2204, without subscribing to the magazine. Only one entry per person is permissible through this method.
9. Last date for receipt of entries to the draw is March 31, 1993. No responsibility accepted for lost, late or misdirected mail.
10. The draw will be conducted at the office of the Consumers' Association at 10 am on April 1, 1993.
11. The winner will be notified by letter and published in the June 1993 issue of CHOICE magazine.
12. The promoter is Australian Consumers' Association, 57 Carrington Road, Marrickville NSW 2204. NSW Permit No. TC92/5245, VIC Raffles & Bingo Permits Board Permit No. 92/3210 issued on 24/11/92, ACT Permit No. TP92/1956 issued under the Lotteries Ordinance, NT No. NT92/1600.

ORDER FORM

Send to:

Australian Consumers' Association
57 Carrington Road, Marrickville 2204
Please allow four weeks for delivery.

Phone: Subscriptions (02) 558 8088

General: (02) 558 0099

Fax: (02) 558 9341

CHOICE

12 issues per year — monthly

CONSUMING INTEREST

4 issues per year — April, July, October, January

TRAVEL

4 issues per year — March, May, August, November

BOX HOLDERS

(holds 24 issues)

FOLDERS

(holds 12 issues)



To speed your order attach your CHOICE mailing label or write in your subscription number:

Qty self	Qty gift	AMOUNT
☐ PERSONAL	☐	@ \$48
☐ INSTITUTION	☐	@ \$63
☐ PERSONAL	☐	@ \$27
☐ INSTITUTION	☐	@ \$33
☐ PERSONAL	☐	@ \$27
☐ INSTITUTION	☐	@ \$33
☐ RED	☐	@ \$12
☐ GREEN	☐	@ \$12
☐ BLUE	☐	@ \$12
☐ RED	☐	@ \$12
☐ BLACK	☐	@ \$12
☐ BROWN	☐	@ \$12
		TOTAL

Please tick

☐ CHEQUE	Payable to Australian Consumers' Association
☐ MONEY ORDER	
☐ BANKCARD	Expiry date ____/____/____
☐ MASTERCARD	
☐ VISA	

Card Number

Name on card Signature

Mr/Mrs/Miss/Ms First name Last name

Address

Postcode

Contact phone no. (____) Include me in Subscriber Draw ☐ Yes ☐ No

GIFT RECIPIENT DETAILS

Mr/Mrs/Miss/Ms First name Last name

Address

Postcode

Gift card to read: To

From Send gift renewal notice to me ☐ Yes ☐ No

IL 9302 INS

CHOICE LINES



Consumer Rights Advice

CHOICE operates consumer rights lines for people having problems with a faulty product or a dispute with a service person. The lines set out what your basic rights are and what steps you can take to protect them. These lines are also available in four languages other than English — Vietnamese, Arabic, Chinese and Turkish.

CHOICE Consumer Rights Advice:

0055 2001

Advice in Vietnamese:0055 2000

Advice in Turkish:0055 2000

Advice in Chinese:0055 2001

Advice in Arabic:0055 2001

Youth lines

A line specifically for young consumers, the 'Ripped-off' Line, outlines your shopping rights as well as letting you know what you can do if you run into problems with something you have bought.

Students can also call a resource line to find out where to get up-to-date information on the consumer movement and the environment. These two topics are the most requested by students and teachers who ring our Consumer Information Service.

CHOICE 'Ripped-off' Line — Advice for Young Consumers: 0055 20007

CHOICE Student Resource Guide: 0055 20012

Product advice

A number of product lines also summarise what to look for when you are buying a particular product. Brand-name recommendations aren't included, however — these remain exclusive to CHOICE subscribers.

CHOICE Washing Machine Advice: 0055 20013

CHOICE Water Filter Advice: 0055 20014

CHOICE Baby Products Advice: 0055 20015

CHOICE Safer Domestic Pest Control Advice: 0055 20016

Other lines

A media 'hotline' provides immediate and accurate background information on consumer issues being reported in the news media, while a 'suggestion line' gives you a chance to say what you would like to see tested or researched for publication in CHOICE.

CHOICE Media 'Hotline': 0055 20018

CHOICE Suggestion Line: 0055 20017

Calls attract a rate of 55 cents per minute.

COMPUTER PRINTERS

Inkjet, thermal fusion or dot matrix?

We compare the technologies and 18 different printers.

FOR THIS REPORT we tested inkjet, thermal fusion and 24-pin dot matrix printers priced at less than \$750. This included general-purpose desktop machines and some small, portable models for use with notebook computers. The range encompasses printers designed for people with quite different needs, so we've split our recommendations into groups, taking different user requirements into account (see *What to buy* on page 30).

Our overall score was based on print quality, speed, noise and the ease of using the front panel controls and instructions. It didn't take paper handling options (and how easy they are to use) into account, as this depends very much on the user's particular needs. The table lists which options are available (so you can rule out any printer which doesn't have those you need) and the profiles include a brief description and assessment of the paper handling capabilities of each model.

We also discuss the pros and cons of the different technologies, to help you decide which type would be best for you.

COMPARING TECHNOLOGIES

■ **Dot matrix:** An older technology, the impact dot matrix printer is probably still the most common type in general consumer use today. It works in a similar way to a typewriter, using a printhead which consists of very small pins (or hammers) and an inked ribbon. The impact of different configurations of pins hitting the ribbon transfers the ink onto the page behind, forming the shapes of the characters and images.

Dot matrix machines are usually cheap to buy and run and, because they use impact, can print carbon copies and multiple-part forms. They're generally considered good workhorse printers and usually have versatile paper handling options. On the downside, they're quite noisy and the quality of their print is not as high as you get from thermal fusion or inkjet machines. This is often particularly noticeable when printing graphics, where they can't produce an image with the same sharpness and detail as the other types. However, the print quality

of all the 24-pin dot matrix printers we tested is better than that of nine-pin printers, and for many purposes is more than adequate, particularly for text.

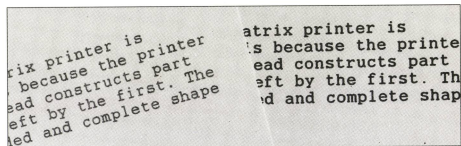
■ **Inkjet:** Marketed as either 'bubble inkjet' or 'thermal inkjet', this type of technology uses cartridges consisting of a supply of ink and a printhead with tiny nozzles, or jets, arranged in it. Each jet has a small heating element embedded in it. When it heats up bubbles are formed in the ink and, as they expand, ink is forced through the jet onto the page as it passes over the printhead. Different arrangements of jets work together to form different characters and shapes.

They are quieter than dot matrix printers, and produce much better-quality print. However, when you run out of ink you have to replace the whole cartridge and currently these are quite expensive. This makes inkjets more expensive to run than dot matrix machines. Also, because they're not impact printers

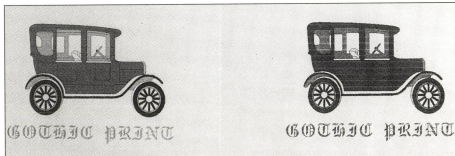
you can't use them to print carbon copies or multipart forms.

■ **Thermal fusion:** This type of printer is a fairly new entry on the consumer market. Like dot matrix printers, they use inked ribbons, but the ink is transferred to the page using heat rather than the impact of pins. An array of tiny heating elements on the printhead selectively 'melts' portions of the ink compound, which stick to the page as the printhead passes over it, forming shapes and images.

Like the inkjet, this form of printing produces high-quality print and, as it doesn't use impact to transfer the ink to the page, is generally very quiet but can't print carbon copies. The technology it uses allows the printhead to be very small, so suitable for portable printers. At the moment it has two main drawbacks: its slow printing speed and the price of the special ribbons it requires, but this price may change if these printers capture a larger market share.



Clarity and sharpness of the text, even in very small sizes, mark the difference between the best and the worst printers in letter-quality mode. Here, a page printed by the Tandy DMP-310, which was one of the worst in this mode, lies on top of a page from the best (the Citizen PN48) for comparison.



All the inkjet printers were superior to dot matrix models at printing graphics. Here the fine lines and detail printed by the Hewlett-Packard DJ 500 (left) contrast clearly with the coarser bands of print and lack of detail exhibited by the Epson LQ-100. The Epson, however, was the best of the dot matrix models for printing letter-quality text.

PAPER HANDLING FEATURES

As well as their very different technologies, the printers we tested varied greatly in their paper handling capability. The features for feeding paper that are built into a printer depend on the use for which it was designed. The two types of paper these printers can handle are **cut sheet** and/or **continuous forms**.

Cut sheet refers to single sheets of paper, those used for typing and photocopying. Some printers come with a cut sheet feeder, which holds a stack of sheets and feeds them into the printer one at a time as needed. On others, you can buy one as an optional extra. Without a cut sheet feeder, you'd have to feed sheet paper into the printer a sheet at a time — very tedious if you have to print long documents.

Continuous forms are stacks of joined paper perforated at each page so sheets can be separated easily. Holes in tear-off sections on each side of the page fit over spikes on the wheels of a tractor mechanism on the printer; as the wheels turn the paper is either pushed or pulled continuously through the printer. The advantages of push vs pull feeding are discussed on page 34.

A continuous forms tractor allows you to load a whole box of paper at once. This kind of paper is cheaper, so is good for anyone who prints out many drafts. With a tractor, you can also print labels and multipart forms.

If you're short of desk space it may matter to you whether the paper loads from top or bottom, front or rear; the printer profiles detail this.

PITCH AND TYPEFACE SETTINGS

Most printers have a selection of different typefaces (the number available on each printer we tested is listed in the table). Each typeface can usually be printed in a wide range of sizes, known as pitches. The standard pitch is 10 characters per inch (cpi), and most typefaces can be printed in a variety of sizes from 10 to 20 cpi and a variety of proportional sizes.

We didn't rate the printers in our test on the range of typefaces and sizes available, as the value of these depends on the individual needs of the user. If you need a particular typeface on your printer, check with the dealer before you buy. Some printers allow you to buy extra typefaces in the form of cartridges, which you plug in.

With many modern computer software programs (for example Microsoft Windows) the range of typefaces available depends on the software, rather than those supplied with the printer. You

can increase the number of typefaces available by 'downloading' them into the printer's memory. This means the shape of the letters is controlled by software, and you can either buy a typeface software program off-the-shelf, or design and program the shapes yourself. Again, if you're interested in these, check with the dealer before buying.

Which type and model of printer is best depends on what you want to do with it. You need to work out which factors matter most to you: do you want really good text print quality, a fast printer, or one that does great-quality graphics? While the very small ones look appealing, they can be inconvenient to use so would be unsuitable for people who wanted to print large documents or lots of copies, for example.

We've worked out our recommendations for three different scenarios. If none of them matches your requirements you can use the information in the table to find the best printer for you. For people who are short of space, the dimensions of each printer are included in its profile.

■ If you want a **high-quality cut sheet printer** (to print letters on letterhead paper, reports or newsletters, where good presentation is important, for example) you would probably want a printer with: — High print quality, particularly in text mode but reasonably good also for graphics.

— High-capacity cut sheet feeder, preferably built in.

Using these criteria, the following printers are recommended:

Brand/model (in rank order)	Price (£)
HEWLETT PACKARD DJ 500	550/639
equal BROTHER HJ1001	565/920
equal CANON BJ-10ex	565/850
OLIVETTI JP 150	595/650
EPSON LQ-100	399/599

The **HEWLETT PACKARD** achieved the best overall score in our test, and comes with a cut sheet feeder.

The **CANON**, **BROTHER** and **OLIVETTI**, all inkjet printers, have good print quality but you would need to purchase the optional cut sheet feeder to make printing larger print runs convenient — otherwise the only option is feeding single sheets by hand! The **EPSON LQ-100**'s print quality was not as good as the other four (especially for graphics), but it's the best of the dot matrix printers for text mode and comes with a built-in cut sheet feeder. Given its low running costs, it may be a good choice for some people with these needs.

■ For general home or small business use, most people would probably want a printer that:

— Has versatile paper handling options (tractor for continuous forms, and cut sheet feeder).

— Is reasonably fast, particularly in draft mode.

— Is cheap to run.

On these criteria the following printers are recommended:

Brand/model (in rank order)	Price (£)
EPSON LQ-570	595/799
equal PANASONIC KX-P2123	650/699
STAR LC24-20	495/675
equal NEC P3200	683/699
SEIKOSHA SL-90	450/535
PANASONIC KX-P1123	380/535
EPSON LQ-100*	399/599
equal BROTHER M1324	450/467
OSBORNE 1024	395/495

* This model has a built-in cut sheet feeder but no tractor feeder, which is available as an optional extra. All the other models have a built-in tractor feeder, with a cut sheet feeder as an optional extra.

■ If you need portability, and may need to use the printer when you don't have access to mains power, you would need a printer that:

— Can run on battery power.

— Is small and lightweight.

Based on these criteria the following are recommended:

Brand/model (in rank order)	Price (£)
equal BROTHER HJ1001	565/920
CANON BJ-10ex	565/850
CITIZEN PM48	499/595

While five of the printers tested could be battery-operated and were reasonably portable, the **CANON BJ-10ex** and the **BROTHER HJ1001** (which are technically identical machines) were clearly the best of them. The **CITIZEN** is a lot smaller and lighter, but much slower (over 1 1/2 minutes to print a page) and the **CANON**'s and **BROTHER**'s running costs are lower.

The **SEIKOSHA LT-20** and **TANDY DMP-310** are also able to be battery-operated. They are virtually identical, with built-in cut sheet feeders, but are large and heavy compared with the other three. Their print quality is lower, and they are quite noisy when in use; they also had the two lowest overall scores yet were similarly priced to the other three. On the other hand, the cut sheet feeder is only an optional extra with the **CANON**, **BROTHER** and **CITIZEN**.

The **SEIKOSHA LT-20** was the only printer we tested that came with a rechargeable battery pack. You can buy one as an optional extra for the other three.

THE RIGHT DRIVER

SOFTWARE PACKAGES are generally linked to printers via a printer driver. This is a program which acts as interpreter, enabling computers to tell printers what to do. Many software producers put out a whole range of special drivers for particular printers, so check when you're buying a printer whether your software has the right driver. In some cases, a printer will be compatible with more than one driver, but will achieve the best results with the driver designed particularly for it.

The two EPSON models we tested are an example of this. Both can be used with any EPSON driver, but also support a new

control language called **ESC P2**. This is an enhancement of the older driver used by EPSON printers and includes a different graphics mode, enables these printers to implement scalable fonts and has other additional features.

We didn't test the EPSON models using the **ESC P2** driver because, as it's only recently been developed, it's only available on the latest versions of popular software packages. However, it should be pointed out that if these two printers are used with **ESC P2** some enhanced features become available and the quality of the print in graphics mode is claimed to be improved.

PROFILES

Models listed in the three *What to buy* lists are profiled here in overall rank order. Prices shown indicate the range found in nationwide checks in December 1992.

HEWLETT PACKARD DJ 500

Price: \$550/\$639

Type: Inkjet

Dimensions of base: 430 x 375 mm

High-quality print and the built-in sheet feeder make this inkjet the best model we tested for quality printing and presentation. The lack of a tractor option limits the versatility but it's easy to use and offers some good features.

Other good points

- Very good-quality print for both text and graphics.
- The fastest we tested, for both text and graphics.
- Built-in sheet feeder which holds 100 sheets.
- Reasonably easy to use and set up.
- The quietest printer tested.

Bad points

- No tractor feed option.
- More expensive to run than dot matrix printers.

Paper handling summary

The feeder is easy to load and appears reliable. Printed sheets are neatly stacked in a tray on top of the paper feeder. Envelopes can be fed from the front.

CANON BJ-10ex/BROTHER HJ1001

Price: \$565/\$850 (Canon)

\$565/\$920 (Brother)

Type: Inkjet

Dimensions of base: 310 x 215 mm

Very good for A4 sheet printing. Portable, quite small and lightweight. If you added a cut sheet feeder, it would make a good desktop printer as well.

Other good points

- Very good-quality print for both text and graphics.
- Easy to use.
- Very quiet.
- Quite fast for letter-quality text and graphics.
- Can be run from batteries.
- Can be stood on its end to save desktop space.

Bad points

- Cut sheet feeder is an optional extra, and no tractor feed option.
- More expensive to run than dot matrix printers.
- No speed increase in draft mode.
- Limited pitch and typeface control from front panel.

Paper handling summary

Can feed single cut sheets from top, or from rear if it's stood on its end. Top feeding is fairly easy; rear feeding is more difficult. Sheet feeder (which holds 50 sheets) costs around \$95 (Canon)/\$110-\$121 (Brother).

OLIVETTI JP 150

Price: \$595/\$650

Type: Inkjet

Dimensions of base: 400 x 300 mm

Very good for A4 sheet printing. For long print runs the optional cut sheet feeder would be essential. Quite a compact design and, when not in use, folds up to take up minimal desk space.

Other good points

- Very good print quality for both text and graphics.
- Compact design.
- Reasonably easy to use controls and set up.
- Very quiet.

Bad points

- Cut sheet feeder is an optional extra, and no tractor option.
- More expensive to run than dot matrix printers.
- Limited front panel control. To change most options the printer must be turned off and reinitialised.

Paper handling summary

Sheets are loaded from the front; it is fairly easy to load them straight. Cut sheet feeder costs around \$100.

(profiles continued overleaf)



HEWLETT PACKARD DJ 500



CANON BJ-10ex



OLIVETTI JP 150



EPSON LQ-570



PANASONIC KX-P2123



STAR LC24-20



NEC P3200



SEIKOSHA SL-90



PANASONIC KX-P1123



EPSON LQ-100



OSBORNE 1024



CITIZEN PN48

EPSON LQ-570

Price: \$595/\$799

Type: Dot matrix

Dimensions of base: 430 x 370 mm

Very good general-purpose printer with versatile paper handling options. It has a very good range of built-in typefaces and sizes and the controls are well set out and extremely easy to use.

Other good points

- Good text print quality for a dot matrix printer.
- Reasonably fast for both text and graphics.
- Very easy to use controls.
- Low running costs.

Bad points

- Very noisy.
- Unless you have the latest software, graphics print quality only fair (see *The right driver?* on page 31).
- Limited pitch setting from front panel.

Paper handling summary

Has built-in tractor, which can be set up to be either push or pull paper through. Continuous forms can be loaded from the top, bottom and front and are easy to load and set up. In push mode, it has paper parking and tear-off features (see page 34 for the advantages of these). Single cut sheets can be loaded from the top (easily) or the front (more difficult). Two cut sheet feeders are available as optional extras.

PANASONIC KX-P2123

Price: \$650/\$699

Type: Dot matrix

Dimensions of base: 455 x 360 mm

Good general-purpose printer with reasonably versatile paper-handling features. Print quality and speed are average.

Other good points

- Good range of built-in typefaces.
- Comprehensive control of typeface and pitch from front panel.
- Reasonably quiet for an impact printer.
- Low running costs.

Bad points

- Control panel can be confusing to use.
- Can be awkward to load forms when feeding from rear.

Paper handling summary

A fixed tractor is built in; it operates as a push tractor when forms are fed from rear and as

pull-feed from the bottom. Loading forms from the rear is harder than for most other models. When rear-feeding forms, paper parking and tear-off features are available. Single sheets can be loaded (with care) from the top. An optional cut sheet feeder is available.

STAR LC24-20

Price: \$495/\$675

Type: Dot matrix

Dimensions of base: 465 x 330 mm

A good general-purpose printer with a good range of built-in typefaces. Very good sheet feed guides made this one of the easiest units for loading single sheets. Print quality is average.

Other good points

- Direct control of all pitch and typeface settings from easy-to-use front panel.
- Reasonably fast.
- Low running costs.

Bad points

- Reasonably noisy.

Paper handling summary

Comes with a fixed push tractor which is easy to load and use; has paper parking and tear-off features. Single sheets can be loaded easily from the top. An optional cut sheet feeder and pull tractor are available.

NEC P3200

Price: \$683/\$699

Type: Dot matrix

Dimensions of base: 470 x 340 mm

General-purpose printer with good features. Easy to use, and quiet for an impact printer.

Other good points

- Versatile paper handling.
- Good range of built-in typefaces.
- Front panel controls very well set out and easy to use, giving full control of pitch and typeface.
- Low running costs.

Bad points

- Graphics print quality among the worst.

Paper handling summary

Tractor can be set up to push or pull. Paper parking and forms tear-off features are available in push tractor mode. Forms can only be loaded from rear but are easy to load and set up. Single sheets can be loaded easily from the top. An optional cut sheet feeder is available.

RUNNING COSTS

HOW DO the different types of printer compare for running costs? We conducted a small test to find out. We ran one example of each type until its ribbon or cartridge ran out, and then counted how many pages it had printed.

The **NEC P3200** in letter-quality mode was chosen to represent the dot matrix type. Although the length of the ribbon and its level of saturation will vary greatly between different dot matrix printers, and so vary the print life, the **NEC P3200** should represent a fairly average lifespan. The ribbon used for the test was ink-impregnated cloth.

The **CANON BJ-10ex** was used to represent inkjet printers, and was run in letter-quality text mode. The **CITIZEN PN48** represented thermal fusion printers, using a

single-strike ribbon, which is the type you would use for printing letter-quality text or graphics.

As you can see from the table, the dot matrix worked out to be considerably cheaper than the other types. The print faded throughout the life of the ribbon, but although faint was still legible after 900 pages. This works out to be around two cents per A4 page. The inkjet worked out around eight

cents per page, while the thermal fusion printer was much more expensive still, at more than 50 cents a page.

The actual number of pages you get from your ribbon or cartridge will vary, depending on how you use the printer (for example, how often you print in draft mode compared to letter-quality, or print graphics). However, the relative costs for a particular type of printer would remain the same.

Brand/model	Type	Pages printed	Characters printed	Ribbon/cartridge cost (\$)	Running cost (cents/page)
CANON BJ-10ex	bubble jet	680	1 159 972	55.40	8.1
CITIZEN PN48	thermal fusion	19	32 386	10.15	53.4
NEC P3200	dot matrix	900	1 535 292	17.50	1.9

SEIKOSHA SL-80

Price: \$450/\$535

Type: Dot matrix

Dimensions of base: 400 x 280 mm

Good, basic general-purpose printer. Print quality and speed are average.

Good points

■ Complete pitch control from front panel.

■ Low running costs.

Bad points

■ Only one built-in typeface.

Paper handling summary

Has a fixed push tractor which is easy to load and set up, although the tractor width adjustment is a little awkward to use. Paper parking and tear-off features are available. Forms can only be loaded from the rear; single sheets can be loaded (with care) from the top. A cut sheet feeder is an optional extra.

PANASONIC KX-P1123

Price: \$380/\$535

Type: Dot matrix

Dimensions of base: 420 x 340 mm

General-purpose printer with reasonably versatile paper-handling features. Print quality and speed are average.

Good points

■ Comprehensive control of typeface and pitch from front panel.

■ Low running costs.

Bad points

■ Control panel can be confusing to use.

Paper handling summary

A fixed tractor is built in. When forms are fed from the rear, the tractor operates as a push type; feeding is harder than for most other models, but paper parking and tear-off features are available. Forms can also be bottom-fed, when the tractor acts as a pull type. Single sheets can be loaded (with care) from the top. An optional cut sheet feeder is available.

EPSON LQ-100

Price: \$399/\$599

Type: Dot matrix

Dimensions of base: 375 x 255 mm

Good general-purpose printer, especially if you use cut sheets frequently. It's reasonably compact, with some good features.

Good points

■ Reasonably good print quality for text.

■ Low running costs.

■ Can be stood on its side to save desk space.

■ Built-in cut sheet feeder.

■ Good range of typefaces.

■ Controls very easy to use.

Bad points

■ Unless you have the latest software, graphics print quality poor (see *The right driver?* on page 31).

■ Need to buy tractor as an option.

■ No pitch selection from front panel.

Paper handling summary

Built-in 50-sheet feeder is easy to use. Can feed single sheets from the rear with some difficulty when printer is used on its side. A push tractor (\$89) is available as an optional extra, which is easy to load, set up and install, and has paper parking and tear-off features.

OSBORNE 1024/BROTHER M1324

Price: \$395/\$495 (Osborne)

\$450/\$467 (Brother)

Type: Dot matrix

Dimensions of base: 450 x 315 mm

General-purpose printers, with reasonable flexibility in paper handling. Print quality and speed are average.

Good points

■ Good range of built-in typefaces.

■ Low running costs.

Bad points

■ Reasonably noisy.

■ Limited typeface control from front panel.

Paper handling summary

The built-in tractor can be set up for either push or pull operation. In push mode it has paper parking and tear-off features. Forms can be fed from either the rear or bottom and are easy to load and set up. Single cut sheets can be fed (with care) from the top. An optional cut sheet feeder is available.

CITIZEN PN48

Price: \$499/\$595

Type: Thermal fusion

Dimensions of base: 296 x 90 mm

Although its very small size and weight are appealing, its poor paper handling and slow speed make it unsuitable for most people, unless portability is your main criterion. Print quality is very good when using the single-strike ribbon, but the operating costs in this mode are high.

Other good points

■ Very good print quality, particularly for text.

■ Quiet.

■ Can be run from batteries.

Bad points

■ Very slow in both text and graphics (the slowest tested).

■ No speed increase in draft mode.

■ Changing ribbons is necessary to go between draft and letter-quality modes.

■ Difficult to feed in single sheets.

■ Cut sheet feeder is an optional extra, and no tractor feed option.

■ Very expensive to run — more than 50 cents a page.

Paper handling summary

Cut sheets can be fed from the top, or from the rear when printer is used on its side, but feeding is difficult. An optional cut sheet feeder would be essential if you were going to do large print runs; the distributor informs us they can be ordered at a cost of \$270.

COMPUTER PRINTERS

FEATURES

1

2

3

4

	Brand/model (in rank order)	Manufacturer/ distributor	Type	Origin	Warranty	Price (\$)*	Continuous forms tractor	Cut sheet feeder
	HEWLETT PACKARD DJ 500	Hewlett Packard	inkjet	Singapore	3 years P&L	550/639		✓
equal	BROTHER HJ1001	Canon/Brother	inkjet	Japan	1 year	565/920		optional
	CANON BJ-10ex	Canon	inkjet	Japan	not stated (A)	565/850		optional
	OLIVETTI JP 150	Olivetti	inkjet	Italy	not stated (A)	595/650		optional
	EPSON LQ-570	Epson	impact dot matrix	Japan	1 year P&L	595/799	✓ push and pull	optional
equal	PANASONIC KX-P2123	Panasonic	impact dot matrix	Japan	not stated	650/699	✓ rear push, bottom pull	optional
	STAR LC24-20	Star Micronics	impact dot matrix	Japan	not stated	495/675	✓ push, optional pull	optional
equal	NEC P3200	NEC Information	impact dot matrix	China	3 years P&L	683/699	✓ push and pull	optional
	SEIKOSHA SL-90	Mitsui Systems	impact dot matrix	Japan	not stated (A)	450/535	✓ push	optional
	PANASONIC KX-P1123	Panasonic	impact dot matrix	Japan	not stated	380/535	✓ rear push, bottom pull	optional
equal	EPSON LQ-100	Epson	impact dot matrix	Japan	1 year P&L	399/599	optional push	✓
	BROTHER M1324	Brother	impact dot matrix	Japan	1 year	450/467	✓ push and pull	optional
	OSBORNE 1024	Brother/Osborne	impact dot matrix	Japan	not stated	395/495	✓ push and pull	optional
	FUJITSU DL900	Fujitsu	impact dot matrix	Japan	not stated	475/715	✓ push	optional
	CITIZEN PN48	Pancorp International	thermal fusion	Japan	not stated	499/595		optional
	OLIVETTI DM 124	Olivetti	impact dot matrix	Italy	not stated (A)	499/695	✓ push	optional
	SEIKOSHA LT-20	Mitsui Systems	impact dot matrix	Japan	not stated (A)	675		✓
	TANDY DMP-310	Intertan	impact dot matrix	Japan	1 year P&L	599		✓

* Prices shown indicate the range found in nationwide checks in December 1992.

P&L Parts and labour.

(A) Manufacturer/distributor informs us warranty is one year

1 COMPARABLE MODELS

■ The **CANON BJ-10ex** is identical to the **BROTHER HJ1001** except for colour (the **CANON** is grey, the **BROTHER** beige).

■ The **OSBORNE 1024** is identical to the **BROTHER M1324**.

2 TYPE

The differences between types of printer are discussed in *Comparing technologies* on page 29 and *Running costs* on page 33.

FEATURES

3 CONTINUOUS FORMS TRACTOR

A tractor which feeds a continuous stack of paper (which is perforated so you can easily separate it into pages) is a convenient and versatile paper-handling feature. Tractors can either pull or push the paper through the printer.

Push tractors have two useful features not available with pull tractors: 'forms paper parking' and 'forms tear-off feeding'. With the first, you can feed in single sheets without having to completely disengage the forms paper from the printer (very handy when you want to feed in a single page of letterhead,

for example). With forms tear-off feeding, the paper can be made to advance so the first perforation after the end of your printing is positioned for easy tear-off. Once the printed sheets are removed the paper will back-feed to the top of the page, ready to begin printing. With this feature you'll never be caught out starting to print in the middle of a page. Also, you don't get a blank page at the start of each print run, as with a pull tractor (which needs something to grip while printing the first page). The one disadvantage of push tractors is that when you're printing labels or on thin paper, they are more prone to paper jams and crumpling.

4 CUT SHEET FEEDER

This allows you to load a stack of single sheets of paper, which will be automatically fed into the printer as needed. A tick in this column means the model comes with a built-in feeder. 'Optional' means a feeder which fits the printer is available to buy, but is not included in the retail price.

Note that the **CANON BJ-10ex**, **BROTHER HJ1001**, **OLIVETTI JP 150** and **CITIZEN PN48** come with neither a tractor nor a cut sheet feeder so, unless you buy the optional cut sheet feeder, your only option is to feed in single sheets by hand.

PERFORMANCE

7 8 9 10 11 12

Noise (dB)
Speed-LQ text
(secs/page)

Speed
score (%)

Print quality score (%)
Text Graphics

Ease of use
score (%)

Overall
score (%)

Brand/model
(in rank order)

43	40	84		80		94		73		83		HEWLETT PACKARD DJ 500
45	54	60		88		90		73		78		BROTHER HJ1001
45	54	60		88		90		73		78		CANON BJ-10ex
44	56	60		84		84		67		75		OLIVETTI JP 150
69	55	73		68		44		80		65		EPSON LQ-570
59	55	64		64		56		70		64		PANASONIC KX-P2123
65	58	69		60		48		80		64		STAR LC24-20
56	64	61		68		44		74		63		NEC P3200
65	56	62		60		60		72		63		SEIKOSHA SL-90
62	63	63		64		52		70		62		PANASONIC KX-P1123
59	68	57		72		32		77		61		EPSON LQ-100
67	61	68		56		54		69		61		BROTHER M1324
67	61	68		56		54		69		61		OSBORNE 1024
63	59	73		52		42		66		59		FUJITSU DL900
49	106	5		96		80		50		57		CITIZEN PN48
61	65	56		48		42		61		53		OLIVETTI DM 124
68	80	41		52		44		72		52		SEIKOSHA LT-20
68	88	33		48		54		69		50		TANDY DMP-310

equal
equal
equal
equal
equal

5 BATTERY OPERATION

Models with battery operation are designed to be portable, so can run off rechargeable battery packs. Only the **SEIKOSHA LT-20** came with batteries supplied. For the others they must be bought separately.

8 NUMBER OF TYPEFACES

We've listed how many typefaces are built into the printer. Most models allow you to select several different typefaces and each can be printed in a range of sizes and styles (eg, bold, italic, etc). Some allow you to increase this range by plugging in a cartridge, or by 'downloading' into the printer's memory (see page 30 for more information). If you need particular typefaces, check with the dealer before you buy a printer. (Another word you'll often see used interchangeably with 'typeface' is 'font'.)

PERFORMANCE

7 NOISE

We measured the decibel level produced when printing a line of text at a distance of one metre from the front panel of the printer. Inkjet and thermal fusion printers are much

quieter than dot matrix machines. The loudest model in our test measured 69 dB (the **EPSON LQ-570**), which would be quite disturbing if you were in the same room with it for prolonged periods, and would certainly disrupt conversations or phone calls if it were printing nearby.

8 SPEED - LETTER QUALITY TEXT

We've listed how many seconds it took each printer to print an A4 page of letter-quality text. They varied greatly, with the fastest model (the **HEWLETT PACKARD DJ 500**) printing more than twice as fast as the slowest.

9 SPEED SCORE

We timed how long it took each printer to print an A4 page of text in both letter-quality and draft modes, and an A4 page containing a pie chart. These scores were combined to give an overall speed score (60% text, 40% graphics).

10 PRINT QUALITY SCORE

To assess print quality, a panel of experts examined three pages printed by each model. The first was a typical page of text, including bold and underlining; the second a pie chart containing several fill patterns, printed in high-resolution mode; and the

third was a selection of clip-art graphics images. Each page was given a score. We've listed the score for the text page and the average score for the two graphics pages. For graphics in particular the inkjet and thermal fusion printers were way ahead of the dot matrix models in print quality.

11 EASE OF USE SCORE

This score was based on an assessment of the instructions (30%) and controls (70%). Instructions were judged on their comprehensiveness, layout, clarity and conciseness of the text, and illustrations. The controls were assessed on their size, layout and markings, to see how easy they were to understand and use and which ones were included on the front panel of the printer. The score didn't include ease of loading paper — see profiles for a summary of this aspect.

12 OVERALL SCORE

This score was made up by combining the performance scores with the following weighting:

- Speed: 25%.
- Print quality (text): 20%.
- Print quality (graphics): 20%
- Ease of use: 25%.
- Noise: 10%.

VIDEO RECORDERS

We managed to set the clocks, tune into the television stations and program all 11 video recorders in this test to record a movie that night.

IT'S A NIGHTMARE really. You're about to go out. There's a movie on tonight that you missed when it was on at the cinema and you would desperately love to record it now. But you can't make head or tail of your video.

Video cassette recorders have a bad name for ease of use. "How do you tell there's a teenager in the house? The clock on the video recorder works." Many have poor instructions and cryptic abbreviations on their controls and displays. Often you feel like you need to be an Einstein (preferably a young Einstein) to figure it all out.

We decided to take a closer look at programming a video recorder in this report, since that is probably what causes people most trouble. The *programming* section below gives a guide to the different ways these videos can be set to record, and the *profiles* overleaf give more individual information.

WHAT WE BOUGHT

Video recorders are definitely getting cheaper. In 1987 we tested cheap, 'no-frills' models priced between \$600 and \$1000. The cheapest models these days (not counting the ones you buy down at the pub) are in the \$350 to \$500 price range and they probably have more features than the expensive ones did six years ago. We chose 11, representing the cheapest models in each brand under \$500.

PROGRAMMING

Programming a video recorder to record, or 'timer recording' as it's also called, needn't be a chore. Clear instructions and well-marked controls make life a lot easier. Even though there are a few different programming methods, they all require the same basic information — the time, day and channel of the show you want to record.

■ **Time:** On all models in this test but the AMSTRAD, you set the time you want to start recording and the time you want to stop recording (for example, start 8.30, stop 10.30). With the AMSTRAD you set the time you want to start and the duration (using the same example, start 8.30, duration two hours).

■ **Day or date:** On some video recorders you just set the day of the week (Thursday, Friday, etc). On others you set the day of the month (27, 28, etc). But on most models in this test you need to set the full date (01-04-1993, for example). The full date is useful if you're going on holiday for a couple of weeks, and don't forget if you want to record a movie in the early hours of the morning, it's tomorrow, not today.

You often also need to set a 'program number' to group your settings together. This is often the first number you have to set so can be confused with the channel setting. Most of the time just using program number '1' is fine — unless you want to record more than one TV show while you're away or asleep, in which case the setting for the second show will be program '2', and so on.

Some models make entering these numbers a lot easier by automatically setting the current day, time and channel and the lowest unused program number

('defaults') so you only need to enter the numbers that are different from these. The profiles overleaf of each video recorder give more details.

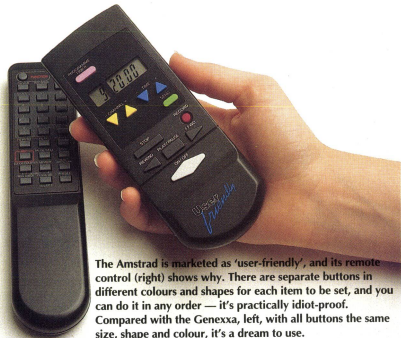
Once you've set all the numbers correctly, all you need to do is press a timer record button, which will put the video recorder on 'standby' until it's time to start recording.

On the models tested, we found five basic programming methods. While a couple of these methods are easier to grasp initially, if you've already mastered one of the others there's no real advantage in changing to a video with a different one. The principles of the five programming routines are described below, although each model may differ slightly in the names of buttons used and ways of correcting mistakes.

■ **Set/enter.** This was the most common method of programming used by the video recorders in this test. In general, you start by pressing a 'program' button. One of the items you need to set (pro-



You program the Akai to record by means of this on-screen menu. It's simple because you can program in any order and can see what you're doing.



The Amstrad is marketed as 'user-friendly', and its remote control (right) shows why. There are separate buttons in different colours and shapes for each item to be set, and you can do it in any order — it's practically idiot-proof. Compared with the Genexxa, left, with all buttons the same size, shape and colour, it's a dream to use.

gram number, date, etc) will start flashing, either on the remote control, front panel of the video recorder or the actual television screen, depending on the model. By using one of two buttons (often indicated by arrows or + and - signs), you can increase or decrease the value of this item. When it's set on the right number you press some form of 'enter' button and the next item will start flashing. By using these three buttons (enter, increase and decrease) you move through each item in order. When it's fully set, pressing the 'program' or 'timer record' button again will finish the process.

■ **Direct entry.** This method is similar to the previous one but you punch in a number directly from a keypad instead of using up and down buttons, and you don't have to press 'enter' between the different items — when you set one, the machine moves automatically on to the next.

■ **Set/enter (direct).** Some 'set/enter' models allow you the option of entering the numbers directly from a keypad, but you still have to press an 'enter' key to move on.

■ **Menu.** The AKAI is the only model in this test with a true menu programming method. The remote control has four arrow keys (a bit like the cursor keys on a computer) which you use to select and set the items from menus displayed on the television screen. The different items can be set in any order and the instructions for the cursor keys are also included on the screen.

Other models in this test also show details on-screen, but the programming method isn't really menu-based.

■ **Separate.** The AMSTRAD has separate buttons for each item to be set. Pressing the day buttons changes the day, for example, and pressing the channel but-

tons changes the channel. This method also allows you to set the different items in any order.

The AMSTRAD, which has been heavily advertised as 'user-friendly', was noticeably easier to use than the others in this test. Given time, even the resident CHOICE moron managed to program it successfully. The remote control and front panel were laid out very simply with different colours and shapes for various buttons, and the instructions were very easy to follow.

TUNING

The other problem area people often encounter with their video recorder is setting it up in the first place, and this is largely due to confusion about tuning it. Finding a television station is like finding a radio station. You move up and down the dial till the reception becomes good.

In most cases your video recorder will appear to your television as an ordinary television channel, so first you need to tune the TV in to the video recorder. The instructions with your television should explain how to do this, but generally you turn the television to an unused channel, put a tape in the video and press play, then adjust the tuning on the television till you see the picture on the tape clearly.

Next stop the tape and, following the video's instructions, adjust the tuning on the video recorder till you get a clear picture on each of your local television stations. This either has to be done manually with the video's fine tuning control, or it may have an auto-tuning feature. By storing the channels in a memory, like the preset stations on your car radio, you never have to fiddle with the tuning again.

HEAD CLEANING

The heads on your video recorder read the information recorded on tapes and convert it into a signal for your television. They can get dirty from playing a lot of tapes, particularly old or poor-quality ones. If you're getting a good picture while watching the television but not while watching videos, that's a sign your heads may be dirty. Consult your user's manual, though, because there can be other reasons for this.

To get your video heads cleaned, most manufacturers recommend you take your video recorder to an authorised service centre. The alternative is to use a head cleaning tape, which is a lot cheaper but some manufacturers claim they can damage the machine. However, at least two manufacturers, SONY and GOLDSTAR, say it's all right to use a head cleaning tape provided it is the right type. Unfortunately the two manufacturers recommend different types. The best advice is probably to avoid using old or dirty tapes in the first place.

RECOMMENDATIONS

Despite being at the cheap end of the market, these video recorders have plenty of features and for ordinary recording and playback, they work fine. The AKAI had the best picture quality and sound quality of all the models tested. It was also reasonably easy to use so ended up the top performer overall.

The AMSTRAD was the easiest machine to use in this test. Unfortunately, however, the picture was indistinguishable when viewing on fast-forward or rewind (picture search), or still frames. Most video recorders have a little bit of 'noise' on the picture when viewed in these modes, but the AMSTRAD, along with the TEAC and GENEXXA, only had little bits of picture among the noise. We believe this would make it almost impossible to find a particular point on a tape (which after all is the main purpose of picture search) and for this reason all three are not recommended.

WHAT TO BUY

Brand/model in rank order	Price (\$)*
AKAI VS-F260	390/449
SHARP VC-A38X	469/578
SANYO VHR-220	449/498
PALSONIC VCR-9000	389/499
equal PHILIPS VR3261	458/475
GOLDSTAR R-G20H	398/410
equal AWA AV-65	414
NEC VN-20	389/460

* Prices indicate the range found in nationwide checks in December 1992.

PROFILES

Models are listed in rank order. Prices shown indicate the range found in nationwide checks in December 1992.

AKAI VS-F260

Price: \$390/\$449

Good points

- Good sound quality.
- Very good, clear picture in normal playback.
- Good picture when fast-forwarding or rewinding (picture search) or pausing.
- Remote control is well laid-out and easy to use.

Bad points

- Nothing in particular.

Programming

Uses an on-screen **menu** for programming. Date, time etc can be set in any order and the current date and time are set automatically. A program list can also be called up, which gives a summary of all the programs currently set.

SHARP VC-A38X

Price: \$469/\$578

Good points

- Good sound quality.
- Good picture when fast-forwarding or rewinding (picture search) or pausing.
- Good instructions in all areas.
- Good remote control.

Bad points

- Nothing in particular.

Programming

Uses the **set/enter** method from the remote control, but numbers can be entered directly from the keypad. You see what you're doing on a liquid crystal display on the remote control and it can be a bit cryptic. The information is not transmitted to the main unit until the 'transfer' button is pressed. Current date and time are set automatically.

SANYO VHR-220

Price: \$449/\$498

Good points

- Good sound quality.
- Good picture when fast-forwarding or rewinding (picture search) or pausing.
- Good instructions in all areas.
- Good front panel controls.
- Good reception sensitivity.

Bad points

- Remote control feels cluttered with small buttons.

Programming

Uses the **direct** method for programming, but with no defaults such as current date or time, so every number must be typed in. Some of the information on the display is a bit cryptic.



AKAI VS-F260



SHARP VC-A38X



SANYO VHR-220



PHILIPS VR3261



PALSONIC VCR-9000



GOLDSTAR R-G20H



AWA AV-65



NEC VN-20



BRANDS NOT INCLUDED

A number of brands were excluded because they have no video recorders with a recommended retail price of less than \$500. They included Aiwa, Blaupunkt, Hitachi, ITT/NAD, JVC, Mitsubishi, Panasonic, Pioneer, Pye, Sony, Telefunken, Tempest and Toshiba.

PALSONIC VCR-8000

Price: \$389/\$499

Good points

- Good, easy to use remote control.
- Good programming instructions.

Bad points

- Worst sensitivity of models tested — meaning there's potential for poor reception in marginal areas.

Programming

Uses the **set/enter** method of programming with an on-screen display that's quite easy to understand. The current date and time are set automatically.

PHILIPS VR3261

Price: \$458/\$475

Good points

- Good sound quality.
- Good picture when fast-forwarding or rewinding (picture search) and pausing.
- Good, easy to use remote control.
- Good reception sensitivity.

Bad points

- Programming instructions a bit confusing.

Programming

Uses the **set/enter** method of programming. Current date and time are set automatically, but the display is a bit cryptic and correcting a mistake is fiddly.

GOLDSTAR R-620N

Price: \$398/\$410

Good points

- Good instructions for tuning and programming.
- Good front panel controls.
- Easy to read display.

Bad points

- Poor still frames.

Programming

Uses the **direct** method of programming with an on-screen display, although some of the information on the display is a bit cryptic. The current date is entered automatically but not the time.

AWA AV-85

Price: \$414

Good points

- Good reception sensitivity.
- Good instructions in all areas.

Bad points

- Second-worst for picture quality in normal playback.
- Remote control feels a bit cluttered in layout.

Programming

Uses the **set/enter** method of programming but cannot be programmed from the remote control. The current time is used as the default start time but not the date. The display can be a bit cryptic and correcting a mistake is fiddly.

NEC VN-20

Price: \$389/\$460

Good points

- Good front panel controls.
- Good reception sensitivity.
- Good programming instructions.

Bad points

- Cluttered remote control.
- The worst for picture quality during normal playback.

Programming

Uses the **set/enter** method of programming and automatically sets the current time and date. Correcting mistakes is relatively easy.

NOT RECOMMENDED

AMSTRAD UF22

Price: \$495/\$499

Good points

- Remote control and front panel controls are both very easy to use.
- Good, well written instructions.

Bad points

- Picture indistinguishable when fast-forwarding and rewinding (picture search) and pausing, although acceptable for normal viewing.

Programming

Uses the **separate** method of programming, so date, time etc can be set in any order. Full programming can only be done from the front panel, but it is possible to record a program within the next 24 hours from the remote control. The current date and time are set automatically. The display is fairly good but can be confusing in some situations.

TEAC MV315

Price: \$398/\$399

Good points

- Good front panel controls.

Bad points

- Picture indistinguishable when fast-forwarding and rewinding (picture search) and pausing, although acceptable for normal viewing.
- Some errors in instructions.
- Cluttered remote control.

Programming

Uses the **set/enter** method of programming and sets the current date and time automatically, but the display can be a bit cryptic. Correcting a mistake is fiddly.

GENEXA VR-2100

Price: \$450

Good points

- Reasonable reception sensitivity.

Bad points

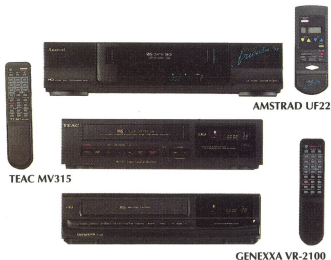
- Picture indistinguishable when fast-forwarding and rewinding (picture search) and pausing although acceptable for normal viewing.
- Worst sound quality of all the models tested.

- Instructions poor in some areas.

- Cluttered remote control.

Programming

Uses the **set/enter** method of programming and sets the current time automatically but not the date, and the display can be a bit cryptic. Correcting a mistake is fiddly.



VIDEO RECORDERS

PROGRAMMING

	1			2	3	4	5	6	7	8	
	Brand/model (in rank order)	Manufacturer/ distributor	Origin	Price (\$)*	RF out	Adequate program capacity	From remote/ front panel	Method	Quick timer record	Instructions	Auto function
	AKAI VS-F260	Akai	Japan	390/449	VHF	✓	✓/—	menu (OS)		fair	
	SHARP VC-A38X	Sharp	Japan	469/578	UHF	✓	✓/—	set/ent (dir)	✓ D	good	✓
	SANYO VHR-220	Sanyo	Japan	449/498	VHF	✓	✓/—	direct	D	good	
equal	PALSONIC VCR-9000	NG Enterprises	Japan	389/499	UHF	✓	✓/✓	set/ent (OS)	D	good	✓
	PHILIPS VR3261	Philips	Malaysia	458/475	UHF	✓	✓/—	set/enter	✓ D	fair	
	GOLDSTAR R-G20H	Kambrook	Korea	398/410	VHF	✓	✓/—	direct (OS)	✓ D	fair	
equal	AWA AV-65	Mitsubishi	Korea	414	VHF		—/✓	set/enter	D	good	
	NEC VN-20	NEC	Korea	389/460	VHF	✓	✓/—	set/enter	D	fair	✓
	NOT RECOMMENDED										
	AMSTRAD UF22	Amstrad	Japan	495/499	UHF	✓	(A)/✓	separate	✓	good	
	TEAC MV315	Teac	Japan	398/399	VHF	✓	✓/—	set/enter	D	fair	
	GENEXXA VR-2100	Intertan	Japan	450	VHF	✓	✓/—	set/enter	D	fair	

* Prices shown indicate the range found in nationwide checks in December 1992. (A) Can only be programmed to record something within 24 hours from the remote.

WARRANTIES

All video recorders in this test came with a one-year parts and labour warranty. **AKAI** allows you to extend this for an additional two years for \$30. **GENEXXA** offers a three-year extension for \$70. The warranty on the **GOLDSTAR** can be extended for four years for \$55. **TEAC** will let you extend the warranty at a cost of \$75 per year for up to four more years, after which time they will give you a new video recorder of comparable quality.

1 COMPARABLE MODELS

According to the manufacturers and distributors the following models are technically similar to ones we tested, which means their performance should be the same, though they may have different features:

- The **AKAI VS-F261**, **VS-F262**, **VS-F300**, **VS-F440**, **VS-F441** are all similar to the **VS-F260**.
- The **SANYO VHR-230** is similar to the **VHR-220**.
- The **SHARP VH-R34X** is similar to the **VC-A38X**.
- The **TEAC MV314** is similar to the **MV315**.
- If you buy a video recorder overseas, make sure it's suitable for use in Australia.

2 RF OUT

This column is important if you have an older television. A video recorder can be connected to a television directly through a video line input or via the aerial socket, also known as the RF (radio frequency)

input. When connected through the aerial the video recorder appears to the television as an ordinary television channel (either VHF or UHF). If your television cannot pick up UHF signals and does not have audio/video line inputs, it won't be able to recognise the signals from a UHF video.

PROGRAMMING

3 ADEQUATE PROGRAM CAPACITY

All video recorders with a tick in this column could be programmed to record up to a month or more in advance and set to record at least six different programs in advance. The **AWA** could record up to four different programs up to a month in advance.

4 PROGRAMMING FROM REMOTE CONTROL AND FRONT PANEL

All but one model in this test could be programmed from the remote control; the **AWA** could only be programmed from the front panel. Two models could be programmed from either the remote or the front panel, though the **AMSTRAD** can only record programs within the following 24 hours if programmed using the remote.

5 PROGRAMMING METHOD

All the video recorders in this test are programmed in slightly different ways but they can be grouped into five general methods outlined in *Programming* on page 36. The

following is a summary:

■ **Set/enter**: Each variable (date, channel, time, etc) is increased or decreased in turn using up and down keys, with the 'enter' key used to move to the next variable.

■ **Direct**: Each variable is entered in sequence directly from the number keys.

■ **Set/ent (dir)**: As for set/enter, but number keys plus 'enter' can also be used to set the value of the variables.

■ **Menu**: An on-screen menu is used with four direction keys to set the variables in any order you like.

■ **Separate**: Each variable has a dedicated button so they can be set in any order.

Three of the models in this test show the programming information on the screen (OS). The rest display details on the front panel of the video recorder or the remote control.

8 QUICK TIMER RECORD

Four of the models in the test (with a ✓ in this column) allow you to undertake a simpler form of programming where you just need to set a time for the video recorder to start recording in the next 24 hours on the current channel and that's it. The **AMSTRAD** also allows you to set a different channel if you wish. Some models allow you to set the duration of the recording if you start recording straightaway (indicated by a 'D' in the table). This could be useful if you don't want to record over something later in the tape. Three models allow fast setting of both the start time and duration.

PERFORMANCE

10

11

12

13

14

RF sensitivity
(%)Ease of use
(%)Sound quality
(%)

Picture quality

(%)

Play

Search/still

Overall score
(%)Brand/model
(in rank order)

✓	67		67		81		73		70		72		AKAI VS-F260
✓	67		69		79		67		70		70		SHARP VC-A38X
✓	70		60		80		65		70		69		SANYO VHR-220
	37		71		72		67		67		66		PALSONIC VCR-9000
	72		62		76		59		70		66		PHILIPS VR3261
✓	65		64		62		64		62		64		GOLDSTAR R-G20H
	75		59		65		57		68		63		AWA AV-65
✓	77		59		72		54		67		63		NEC VN-20
	64		76		68		60		27		60		AMSTRAD UF22
	67		51		72		67		27		59		TEAC MV315
	67		45		50		61		30		52		GENEXA VR-2100

equal

equal

7 INSTRUCTIONS

We assessed each model's instructions for general operation, programming and tuning. The best instructions were well illustrated, well laid-out and explained things simply and well. Those with poor instructions could be difficult to follow if the user isn't already familiar with operating a video recorder.

If the instructions were good in one area, they were also generally good in another, so we have given the overall rating for instructions in this column. The **GOLDSTAR** and **NEC** are the only real exceptions. They would have both scored 'good' for programming instructions alone.

8 AUTO TUNING

If you don't like programming a video recorder you probably don't like the idea of tuning it either. A model with full auto tuning will do the job for you at the touch of a button and set each TV channel it detects on the first few presets. The disadvantage of this is you can't specify your local channels are on presets with the same number (such as channel 7 on preset 7 or channel 4 on preset 4). However, this might be a small price to pay if no one is willing to try setting the presets manually.

9 INDEX SEARCH

If you record a number of different programs on the one tape, this feature lets you set index markers at the beginning of each

program and quickly search for them at a later stage.

PERFORMANCE

10 RF SENSITIVITY

This is a measure of how well the video recorder picks up the TV station's signal and is important for people who live in poor reception areas. We measured the minimum RF (radio frequency) signal strength necessary at the aerial to produce a picture of acceptable quality. The **PALSONIC** scored poorly here because of lack of sensitivity at the low end of the VHF scale (between channels 1 and 5A roughly), which means it could be a problem for ABC fans in poor reception areas.

11 EASE OF USE

Fifty per cent of this score came from the ease of use of the remote controls, since generally they are the main means of controlling the video recorder. The rest of this score included the instructions, the controls on the actual video recorder, and the legibility of the display.

12 SOUND QUALITY

This score includes a measurement of distortion (the purity of the recorded signal when played back), wow and flutter (the ability to keep a constant tape speed and tension), frequency response (the accuracy with which a signal is reproduced across a

wide range of frequencies) and signal-to-noise ratio, which compares the level of the actual signal being recorded with the level of background noise, like tape hiss.

13 PICTURE QUALITY

The picture quality score has been split into two to clearly show where three models fell down in our assessment. The 'play' score is composed of an 'off-air' picture assessment, where a selection of programs was recorded on each machine and the quality of the recorded picture was assessed by our tester, plus a more technical video test made by recording various test patterns on each model and examining the quality of the recording.

The 'search/still' score was based on assessments of the picture while fast-forwarding and rewinding (picture search) and on a still frame. The sharpness and graininess of the picture was noted as well as the presence of any 'noise' or jittering.

14 OVERALL SCORE

The overall score was made up of the above five scores weighted as follows:

- Sensitivity: 10%
- Ease of use: 20%
- Sound quality: 20%
- Picture quality (search/still): 15%
- Picture quality (play): 35%

BUDGET MULTI-DISC CD PLAYERS

What do you gain by buying a multi-disc CD player?

Here's our test of 11 budget models.

MULTI-DISC CD PLAYERS have taken 30% of the CD market already. They cost just a little more but appear to offer a lot more — though it's quite another question whether people actually use the extra capabilities and features they're paying for.

WHICH TYPE? — DRAWER, TURNTABLE OR CARTRIDGE

There are three types of multi-disc CD players: drawer, turntable and cartridge (see photo below).

■ **Drawer:** you can load up to five CDs on a tray which slides into the unit out of sight (a mechanism not unlike a normal single-disc CD unit). There's a separate dish or well to take each disc and on some models, should you wish, you can change one or more discs while another is playing.

We wanted to see if there would be problems if a disc moved out of its well. Would the door jam? We found that though a bump can dislodge a disc there

BRANDS EXCLUDED

SEVERAL manufacturers did not have a multi-disc CD player in our price range: **Denon, Harmon Kardon, JVC, Marantz, NAD, Nakamichi and Onkyo.**

Aiwa, Hitachi, Sanyo and Sharp sell multi-disc units as part of complete systems only.

Those discontinuing or changing models at the time of our purchasing and testing were **Philips, Pye and Sansui.**

was no difficulty opening the door and returning the wanderer to its place.

■ **Turntable:** up to five CDs sit on a tray which is placed on the top of the unit — you get access by lifting the lid, as with a record turntable. The advantages are you can see what discs are in and are able to change discs while another is playing. They also tend to be the cheapest type. The disadvantage is that the unit has to sit on top of your other sound equipment — it can't be stacked in the middle. If space is a consideration don't buy a turntable multi-disc.

■ **Cartridge:** the discs (up to six in the case of the **PIONEER PD-M501**) are inserted into a cartridge which in turn inserts into the player. The cartridge can be used to store the discs and to move them from one CD player (eg in the home) to another (the car). This tends to be a more expensive design — we could only get one budget model for this test

— but it's also the format which offers the most potential. You can buy the cartridges separately, so eventually you could build up a library of them.

There is some talk that cartridge models could jam but we found no evidence of this during testing.

But there is a problem which might turn you off budget multi-disc CD players: in all the models we tested your programming is erased when you take out the discs (or remove the cartridge) or turn the player off. More expensive models allow a program to be held in memory (on the player, not the cartridge) so you don't have to reprogram each time you remove or return that set of discs.

A higher purchase price also brings you more features, extra programming possibilities, cosmetic differences and better sound engineering (not that you'd necessarily notice an improvement in sound quality).

Turntable and drawer models are generally cheaper than cartridge units. Most growth is at the cheap end of the market so that's what we've tested for you: 11 models selling for under \$450.

WHAT YOU GAIN BY BUYING MULTI-DISC

A basic single-disc CD player gives you excellent sound reproduction, the ability to program the tracks in any order, to skip unwanted tracks and repeat others. If there's a remote control you can perform any of these functions (including programming) from the comfort of your preferred recumbent position.

But a multi-disc CD offers more:

■ You have access to five or six discs in the unit at the one time.

■ You can flip between tracks across all discs.

■ You can create a listening program across all discs.

■ With more expensive models you can move cartridges of five or more discs between home and car CD players, tying in with memorised programs on each CD player. You can, if you like, program a different musical mood in each stack.

Essentially it's like having your very own jukebox, with access to 50-100 tracks (at 10-20 per disc) at once. Out of five available disc positions you may



Cartridge (top), drawer (above) or turntable — which type of multi-disc CD to choose? They offer different advantages and disadvantages — see text above.



DO DISCS DIE?

SHOCK REPORTS in the press, magazines and on radio have raised a question mark over the lifespan of compact discs. Have you wasted your money changing your record collection from vinyl to CD?

The CD industry casts scorn on the media beat-up and stands behind the quality of the CD format. What's the real story?

This is the position:

- There is a standard for CD manufacture, called the *Red Book*. If this is followed a good-quality product will result.
- Compact discs don't wear out in use as the spinning disc does not come in contact with the laser pick-up.

At least one UK CD manufacturer, Nimbus, did produce some faulty discs during the mid to late 1980s. There were reports of others. The number of inferior discs was small and information is scanty. The problem was due to deterioration of the aluminium layer in the disc, which holds the digital information. It's believed this occurred because an inadequate coating of protective lacquer was easily damaged in handling, allowing air to enter. Oxidation took place and small holes began to appear in the aluminium. Digital information disappeared and the disc no longer played as intended.

Eventually the major manufacturers of CDs got together to deal with the problem. They found there was no agreed method of testing for disc quality or durability. Towards the middle of 1992 they agreed on an industry standard for testing CDs.

What does this mean for consumers? We don't believe there are grounds for concern about the quality of CDs purchased in Australia. However, CDs are

made by an estimated 100 manufacturers worldwide. Some of these produce discount discs for South-East Asian markets, and were not involved in the development of the new testing standards. Can their disc quality be assured to consumers? There's no definitive answer yet.

How long will a CD last? Manufacturers hedge on this question because no-one really knows. The format is still too new. The estimates run from 20 years, as a worst-case scenario, to 1000 years! What we do know is that we've had CDs now for 15 years (eight in Australia) with very few reported manufacturing faults.

Ultimately it's an academic issue anyway. The real question is whether in 30 years' time you'll have the hardware (that is, a CD player) to play your CDs. Try and buy spare parts for your record turntable now! It's not easy keeping outdated consumer technology.

You've only got to think over the changes in home audio over the last 35 years: from 78 RPM records to 45 RPM, reel-to-reel tapes, cartridges, quadraphonic records, several formats of cassette tapes, video discs, music video tapes, compact discs, digital tapes (DAT and DCC — two quite different formats currently on offer to consumers), CD-ROM, and Sony's new minidisc.

In the year 2023 you might still have a pile of good compact discs, but it's unlikely your new hi-fi will know how to play them — and your old CD player will be broken and unrepairable.

In the meantime your concern should be over proper care of your CD collection. Scratches, bending, long exposure to sunlight, dirt and grime can all interfere with the transfer of information from the disc to the laser pick-up.



leave some favourites in place (the *Schumann* for quiet dinner parties, the *Megadeth* to cover the sound of domestic disputes) and put new acquisitions in the spare spots until you get bored and consign them to the shelf.

Some units lack the flexibility and features of others: not all will let you repeat one track or one disc before moving on to other tracks and discs. See Table 1 overleaf for differences in multi-disc features.

WHAT YOU LOSE ...

Though it's good to have immediate access to so much material you should bear in mind things like programming become a shade more complicated and cumbersome. It's not really difficult but if you can't face advanced CD technology, stick with a single-disc model where all you have to do is load a disc and press *play*.

SOUND QUALITY: ALL EXCELLENT

We carried out a barrage of technical tests to determine audio performance of the units (see notes to Table 2 on page 46). The conclusion was as expected: all offer excellent sound reproduction. All results were significantly better than those you could expect from cassette decks and record turntables. If compared to cassette decks all these CD players would score 100% for audio performance.

However, our tests did measure real differences in technical audio performance and design of these CD players, the practical consequences of which are ultimately not very important because they are differences at the margins (and beyond) of what the human ear can detect. You'd be hard pushed to conclude there was an improvement in sound quality between the cheapest and the dearest or

between the most technically superior and the basic, no-frills models.

As you spend more and more money — beyond the price limit of these budget models — it becomes more probable that a discerning listener could tell one model from another, though not necessarily conclude that the dearer CD player sounded better than the cheaper one.

DOES 'BIT-STREAM' HELP?

Compact discs store music (or other information) as digital data. A CD player takes this digital data and converts it to electrical voltages capable of driving an amplifier and speakers. In the search for better ways of making the conversion, new technologies are applied and the resulting brands and models are promoted in sales brochures and advertising.

(continued on page 46; profiles overleaf)

Table 1.

MULTI-DISC FEATURES

Brand/model (in rank order)	Price (\$)*	Multi-disc format	Number of discs	Remote control	Headphone socket	1	2
						Play one disc only	Repeat one track
SONY CDP-C325	364/429	Drawer	5	✓	✓	✓	✓
AKAI CD-A610	299/399	Drawer	5	✓	✓	✓	✓
YAMAHA CDC-625	389/449	Drawer	5	✓	✓	✓	✓
SHERWOOD CDC-501OR	379/399	Drawer	5	✓	✓	✓	✓
PIONEER PD-M501	359/399	Cartridge	6				✓
TECHNICS SL-PD627	304/450	Drawer	5				
KENWOOD DP-R891	399/429	Drawer	5				
KENWOOD DP-R791	359/379	Drawer	5				
CDC CH5000R	238/399	Turntable	5	✓			✓
CDC CH6000R	294/389	Drawer	5	✓			✓
CDC CH3000	211/304	Turntable	5				✓

* Prices shown indicate the range found in nationwide checks in December 1992.

Since the major difference between the players we tested was their multi-disc features, Table 1 and its explanations of the features is the equivalent of our usual 'profiles' of the products.

1 PLAY ONE DISC ONLY

Though there may be as many as five or six discs in the unit you can instruct it not to play in sequence through them all but to play one disc only then stop. For example, you may only want to listen to disc number four.

2 REPEAT ONE TRACK

You can program the unit to play one track continuously.

3 REPEAT ONE DISC

You can program the unit to repeat one disc continuously.

4 REPEAT PROGRAM

Having programmed an order of tracks and discs you can also instruct the unit to repeat that program.

5 RANDOM PLAY OF ONE DISC ONLY

The unit can be programmed to play tracks in random order but limited to one disc (selected by you).

6 RANDOM PLAY ACROSS ALL DISCS

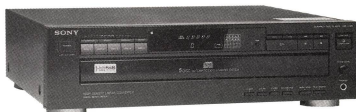
The unit will play tracks in random order, selecting from all discs on the tray.

7 PLAY AND CHANGE

Turntable units and some drawer units let you change any or all remaining discs while one disc is actually playing.

8 PROGRAM FROM REMOTE CONTROL

All units with remote controls enable you to program the unit (order of tracks and discs) from the remote control.



SONY CDP-C325



AKAI CD-A610



YAMAHA CDC-625



SHERWOOD CDC-501OR

3	4	5	6	7	8	Brand/model (in rank order)	
Repeat one disc	Repeat program	Random play of one disc only	Random play across all discs	Play and change	Program from remote control		
✓	✓	✓	✓		✓	SONY CDP-C325	
✓	✓		✓	✓	✓	AKAI CD-A610	
✓	✓	✓	✓	✓	✓	YAMAHA CDC-625	
✓	✓	✓	✓	✓	✓	SHERWOOD CDC-5010R	
	✓		✓		na	PIONEER PD-M501	
	✓	✓	✓	✓	na	TECHNICS SL-PD627	equal
	✓	✓	✓		na	KENWOOD DP-R891	
	✓		✓		na	KENWOOD DP-R791	
	✓		✓	✓	✓	CDC CH5000R	
	✓		✓	✓	✓	CDC CH6000R	
	✓			✓	na	CDC CH3000	

na not applicable — there is no remote control.



PIONEER PD-M501



CDC CH5000R



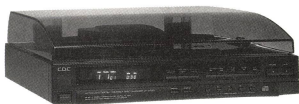
TECHNICS SL-PD627



CDC CH6000R



KENWOOD DP-R891



CDC CH3000



KENWOOD DP-R791

Table 2.

PERFORMANCE					1	2	3
Brand/model (in rank order)	Manufacturer/ distributor	Origin	Price (\$)*	Warranty (years)	Technical audio score (%)	Ease of use score (%)	Overall score (%)
SONY CDP-C325	Sony	Japan	364/429	3 (B)	92	81	85
AKAI CD-A610	Akai	Korea	299/399	1	89	72	79
YAMAHA CDC-625	Yamaha	Japan	389/449	1 (C)	85	73	78
SHUREWOOD CDC-5010R	Electronic Imports	Korea	379/399	3 (B)	81	75	77
PIONEER PD-M501	Pioneer Electronics	Japan	359/399	not stated (D)	86	66	74
equal TECHNICS SL-PD627	Panasonic	Japan	304/450	1 (E)	85	63	72
KENWOOD DP-R891 (A)	Kenwood Electronics	Japan	399/429	1	74	70	72
KENWOOD DP-R791 (A)	Kenwood Electronics	Japan	359/379	3 (B)	74	69	71
CDC CH5000R	Teac	Japan	238/399	90 days	71	68	69
CDC CH6000R	Teac	Japan	294/389	1	75	64	68
CDC CH3000	Teac	Japan	211/304	90 days	71	63	66

* Prices shown are indicative of the range found in nationwide price checks in December 1992.

(A) The Kenwood DP-R791 and DP-R891 have been replaced by the DP-R792 and DP-R892 respectively; Kenwood says there are cosmetic differences only.

(B) Only one year on laser.

(C) Yamaha advises there is a five-year warranty, but only one year on the laser mechanism.

(D) Pioneer advises there is a three-year warranty, including the laser mechanism.

(E) Panasonic gives the standard warranty on the Technics is one year, but this increases to three years if the warranty form is returned promptly.

1 TECHNICAL AUDIO SCORE

Audio score was based on technical tests for frequency response, harmonic distortion, linearity (how closely changes in sound volume recorded on a disc are reproduced by the CD player), channel separation (spill of unwanted sound between the two stereo channels), dynamic range and signal-to-noise ratio.

'Bit stream' technology is the current buzzword in the shops, said to offer truer reproduction and clearer sound. Using technical audio tests we compared bit stream converters (such as the SONY CDP-C325) with normal units: the results were inconclusive.

That is not to say bit stream technology is a con. Here we've tested models at the cheaper end of the market where components of lower quality may offset real gains in performance made by the bit stream converter. More expensive units may show an appreciable difference, but we haven't tested these yet.

EASIEST TO USE

As they all sound so good your purchasing decision comes down to features, ease of use, aesthetics and value for money.

In rating the models for ease of use we awarded points for ease of programming, the way in which information was shown on the display panel, the ease of use of controls, helpfulness of instructions and general features.

The SONY CDP-C325 scored highest, particularly due to its good instructions and ease of programming.

2 EASE OF USE SCORE

The score for ease of use was based on ease of programming, available functions and usability of controls (both on the deck and on the remote control, if any), usefulness and legibility of the display, general features and quality of the instructions supplied.

If you really have trouble coming to grips with new technology, you'll find the instructions with the KENWOODS, SONY, TECHNICS and YAMAHA a great help. Their text is concise and the diagrams are easy to follow.

DISPLAY

Each CD player has a fluorescent display panel to tell you what's going on. There used to be significant differences in the amount of information provided by different models, but all units in our test give you the essentials: total number of tracks on disc and which track is playing, number of disc playing, total disc playing time, time elapsed and remaining on the track playing now, and what is happening (play, stop, search, no disc, etc).

Those with cluttered or poorly laid-out display screens were the AKAI, PIONEER and TECHNICS. However, if you find them with a good purchase price this is not a significant concern.

CONCLUSIONS

Your ears may not appreciate the difference but your mind should: the SONY CDP-C325 leads the way for technical

3 OVERALL SCORE

Overall scores were reached by weighting and combining results as follows: technical audio (40%) plus ease of use (60%). Less weight was given to the technical audio score because the general level of performance is so high that in fact the main difference between the models is their ease of use.

audio performance in this bunch of budget multi-disc CD models. It's our pick more for its class and finesse than because it will necessarily sound any better to your ears. It's also by far the easiest of these 11 models to program and use.

The CDC models are ranked lower because they're let down by more difficult programming, poorer instructions and fewer features. Audio results were still excellent.

In making your choice bear in mind the type of multi-disc system you want (drawer, turntable or cartridge — see text) and any special features (Table 1).

TOP PERFORMER

SONY CDP-C325

\$364/\$429

The SONY was well ahead of the others, and we recommend it. But as you won't be disappointed with the sound quality of any of them we think you'd end up as happy with one of the others if you can get a significantly better price than for the SONY, working your way down the list in the table.



WHAT DO YOU KNOW?

- 1 According to OECD figures, which country's government spends the most money on environmental research and development?
 - A) Australia.
 - B) Canada.
 - C) Finland.
 - D) Germany.
- 2 What percentage share of Australian government R&D expenditure is spent on environmental research and development?
 - A) Less than 2%.
 - B) Less than 5%.
 - C) Less than 10%.
 - D) More than 10%.
- 3 The latest electronic media technology is called IT, which stands for:
 - A) International Television.
 - B) Interactive Television.
 - C) Interpersonal Television.
- 4 In what year was the first case of AIDS (Acquired Immune Deficiency Syndrome) diagnosed in Australia?
 - A) 1975.
 - B) 1979.
 - C) 1980.
 - D) 1982.
- 5 In what year were automatic teller machines introduced in Australia?
 - A) 1975.
 - B) 1979.
 - C) 1980.
 - D) 1982.
- 6 The Commonwealth Government has decided to ban what type of sponsorship of sports telecasts?
 - A) Alcohol.
 - B) Tobacco.
 - C) Fast food.

ANSWERS

1. **D** — Germany's public sector spent \$420 million on environmental research and development in 1989 (the US government also spent this amount). Canada spent \$50 million, Australia \$20 million and Finland \$15 million. In fact, Finland and Austria were the only two OECD countries to spend less in this area than Australia.
2. **A** — The OECD figures state that environmental R&D represented 1.3% of total government R&D expenditure in Australia for 1989. By comparison, Germany's expenditure represented 3.4%, the United States' 0.5% and the Netherlands' 3.8%.
3. **B** — Interactive television will allow viewers to join in programs, buy products, win prizes, purchase lottery tickets, bet on the TAB and participate in television polls. All these activities will be transmitted to and from the IT decoder box on top of the television set.
4. **D**.
5. **C**.
6. **B** — But the ban casts doubt on other forms of future sponsorship, such as by alcohol manufacturers.



RECALLS AND BANS

If you find a recall or ban not on our list please let us know.

Philips has recalled PHILIPS 63 cm COLOUR TELEVISION V6820 and MARANTZ 63 cm COLOUR TELEVISION MTV750 (purchased new between 1985 and 1987) as a component on a printed circuit board can work loose, causing arcing with the risk of serious damage. Do not leave the set on while unattended. Contact Philips to arrange rectification in your home free of charge. Call 008 011 061.

Kleber has recalled KLEBER TYRES, SIZE 225/50 R 16 WITH SPEED RATING V & Z as circumferential cracks may develop in the lower sidewall area of the tyre. Affected tyres can be identified by the last three digits of the DOT (US Department of Transportation) number on the tyre sidewall: V tyres from DOT EX...091 to ...381, Z tyres from DOT EX...032 to ...122, DOT EX...152 to ...202, DOT EX...292 to ...302 and DOT EX...412 to ...442. Contact your nearest Bob Jane T-Mart to arrange for exchange.

Rhone-Poulenc Rorer Australia has recalled BIOGLAN CHILDREN'S MICELLE batch 235320, expiry July 1994, as some bottles may be of adult-strength vitamin A formulation. The bottles are labelled correctly but the outer packaging is labelled incorrectly. Do not use. Return to place of purchase for replacement or refund.

Nutritional Marketing has recalled PEOPLES CHOICE NETTLE (COMMON) TEA 50 g pack, batch B1792 and batch B1792, as testing by the Therapeutic Goods Administration Laboratories has shown contamination by matter of animal origin. Return to retailer for refund.

Winthrop Laboratories has recalled PANADEINE FORTE 20-tablet pack, batch J1123, prescribed since October 20, 1992, as a small glass fragment has been found in one tablet. Return to your pharmacist for replacement. Batch number is on carton and on foil.

Swann Electrics has recalled SWANN NITELITE and TOBIN SUPER-BRIGHT NITELITE as the cover may detach from the base easily and expose an electrical hazard. Return to place of purchase for replacement.

Saab has recalled 1979-1992 MODEL SAAB CARS 900i and 900 TURBO (with the last eight digits of the chassis number up to -N2012919 or -N7007778) as the lower control arms in the front suspension may break while turning in reverse gear, resulting in collapse of the front suspension and loss of steering control. Contact your Saab dealer to arrange inspection and replacement of lower control arms where necessary.

Target has recalled TARGET 50 CHASING CHRISTMAS TREE LIGHTS SET as, if left on continuous lumination, there is a risk of globes overheating, causing melting of the plastic connections. Return to Target for refund.

Bonlac Foods has recalled PAYLESS BRAND CHEESE 1.0 kg PACK, marked 48 PROCESSED CHEDDAR SLICES (use-by date July 30, 1993, and batch no. 302 304), as bacterial contamination may lead to sickness if consumed. Return to retailer for refund.

BRITTEHEAT 4-SLOT FUSEWIRE CARD (containing one-metre lengths of 8 amp, 16 amp, 20 amp and 30 amp fusewire, catalogue no. B4FC) sold in Queensland, Victoria and WA, has been recalled as the wires have been wound in reverse order and may constitute a fire and electrical hazard.

Netcomm (Aust) has advised users of NETCOMM MODEMS sold during 1992 and possibly 1991 that there is a minor engineering deficiency which is evident if using pulse dialling within two kilometres of your local exchange. The existing line cord may not comply with the Telecommunications Act and will be replaced by Netcomm if necessary. Write to Netcomm at Reply Paid No 128, PO Box 379, North Ryde 2113, with your name, address, model number and serial number of your modem so details can be checked.

WARNING

BABY-WALKERS are being investigated by the NSW Product Safety Committee to consider whether they should be banned. Serious injuries have been associated with the use of these products. Three brands of baby-walkers were withdrawn from sale late last year as they did not carry mandatory safety warnings.

PLEASE SEND US

- change of address ■ renewal
- subscription inquiries

Just write to:

The Subscription Section
Australian Consumers' Association
57 Carrington Road, Marrickville 2204,
or phone (02) 558 8088

TWELVE MONTH INDEX

APRIL 1992 — MARCH 1993

(T) test

(D) includes assessment of suitability for those with disabilities

(F) feature — general advice

(M) feature — includes market information

(S) subscriber survey or user trial

(C) Consumer in law

(L) letter

(U) update of previous report

* additions or corrections to reports

Abattoirs	Jun(F),Sep(L)	Electric frypans	Aug(T)	Microwave ovens, small	Jun(T,D),Aug*
Air conditioners, reverse-cycle	Nov(T,D)	Energy use in the home	May(F)	Mistral fans	Apr(C)
Air quality, indoor	Jan(F)	Fans, Mistral	Apr(C)	Mod-n-Aire gas heater	Jul(F)
Allergies	Nov(F)	Food		Money for travelling	May(F)
Answering machines	Oct(T)	canned, drained weight	Aug(T)	National and 'generic' brands	Aug(F)
Arthritis	Oct(F)	cholesterol and oat bran	Jun(F)	Network selling	Jul(F)
Audio equipment		coffee bags	Oct(S)	Notebook computers	Dec(T)
buying hifi components	Apr(F)	frozen desserts	Dec(T)	Oat bran	Jun(F)
car radio/cassette players	Jun(T)	fruit substitutes for kids	Mar(T)	Orbital sanders	Jun(T)
CD players, multi-disc	Mar(T)	irradiation of	Aug(F)	Ozone layer	Aug(F)
Australian-made labelling	Jan(F)	packaged meals for kids	Feb(M)	Packaging, 'green'	Jun(F)
Bank accounts	Sep(M),Nov*	soy drinks	Apr(T)	Pay TV	Oct(F),Feb(L)
Barbecues, kettle	Jan(T)	sugar in	Apr(F)	Pest inspections	May(F),Jul(L)
Bicycle helmets	Oct(T)	yoghurt	Nov(T,F)	Phone advice, legal	Nov(C)
Blenders, handheld	Nov(T,D)	Frypans, electric	Aug(T,F)	Phones	
Breast cancer	Jan(F)	Funerals, organising	Sep(F)	cellular	Jul(T,D),Oct(L)
Buying guide, annual	Dec	Gas heater, Mod-n-Aire	Jul(F)	cordless	Dec(T,D)
Cameras, compact	Feb(T)	Gas heaters, unflued	Apr(T,D)	Pool fences	Dec(F)
Carpets		'Generic' and national brands	Aug(F)	Reclaiming stolen property	Sep(C)
spot cleaners for	Sep(T)	Goods and services tax	Jul(F),Oct(L)	Refrigerators, 300-350 litre	Sep(T,D)
stain-resistance treatments	Nov(T)	Greenhouse effect	Oct(F)	Reliability survey, cars	Aug(S)
Cars		Hair and hair products	Jan(F)	Retirement villages	May(F)
clamping and tow-away	Feb(C)	Handheld blenders	Nov(T,D)	Reverse-cycle air conditioners	Nov(T,D)
insurance	Dec(S)	Health insurance	Nov(M)	Safety switches	Jul(F)
radio/cassette players	Jun(T)	Heaters, gas unflued	Apr(T,D)	Sanders, orbital	Jun(T)
reliability survey	Aug(S)	Helmets, bicycle	Oct(T)	Savings plans	Mar(F)
steering wheel locks	May(T,D)	Hifi, buying components	Apr(F)	Secateurs	Oct(S),Feb(L)
CD players, multi-disc	Mar(T)	Home, chemicals in the	Sep(F)	Shade materials	Jan(F)
Cellular phones	Jul(T,D),Oct(L)	Hormone replacement therapy	May(F)	Skates, in-line	Dec(T)
Chemicals in the home	Sep(F)	Household energy use	May(F)	Skipping pills	Apr(F)
Cholesterol and oat bran	Jun(F)	Index, three-year	Jun	Soy drinks	Apr(T)
Coffee bags	Oct(S)	In-line skates	Dec(T)	Spot carpet cleaners	Sep(T)
Complaints against lawyers	Jun(C)	Indoor air quality	Jan(F),Mar*	Standards Australia	Dec(F),Feb(L)
Computer printers	Mar(T)	Insurance		Steering wheel locks	May(T,D)
Computers, notebook	Dec(T)	car	Dec(S)	Stolen property, reclaiming	Sep(C)
Cordless phones	Dec(T,D)	health	Nov(M)	Sugar in food	Apr(F)
Cosmetics, animal testing	Mar(M)	Irradiation of food	Aug(F)	Sun protection	Jan(F)
Credit cards	Feb(F)	Jargon, economic	Oct(F)	Superannuation guarantee	Feb(F)
Desserts, frozen	Dec(T)	Labelling, Australian-made	Jan(F)	Supermarket survey	Jul(S)
Detergents, laundry	Mar(T)	Lawyers, complaints against	Jun(C)	Tampons	Apr(T)
Dishwashers	Feb(T,D)	Legal advice, by phone	Nov(C)	Tax, goods and services	Jul(F),Oct(L)
Do-it-yourself and the law	May(C)	Lost wallet, what to do	Aug(C),Nov*	Tax, rights and obligations	Mar(C)
Drained weight of canned food	Aug(T)	Laundry detergents	Mar(T)	Telecommunications	Feb(M)
Economic jargon explained	Oct(F)	Meat production	Jun(F),Sep(L)	Travel money	May(F)
				TV, pay	Oct(F),Feb(L)
				TVs, medium-sized	Jul(T,D)
				Unit pricing	Sep(F)
				Vets' fees	Nov(F),Jan(L),Feb(L)
				Video recorders	Mar(T)
				Wallet, if you lose	Aug(C),Nov*
				Washing machines	Jan(T,D),Mar*
				Water filters	Feb(T)
				Yoghurt	Nov(T,F)